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To the Graduate Council:

I am submitting herewith a dissertation written by Barry S. Tuchfeld entitled "Social Psychological and Hormonal Correlates of Alcohol Consumption: A Psychobiological Study of Social Behavior." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Sociology.

Louis Dotson

Louis Dotson, Major Professor

We have read this dissertation and recommend its acceptance:

Suzanne B. Kurth

John W. Philpot

Thomas C. Hood

Donald W. Hastings

Accepted for the Council:

Hilton A. Smith

Vice Chancellor
Graduate Studies and Research

SOCIAL PSYCHOLOGICAL AND HORMONAL CORRELATES OF ALCOHOL CONSUMPTION: A PSYCHOBIOLOGICAL STUDY OF SOCIAL BEHAVIOR

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Barry S. Tuchfeld

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"Why am I as I seem to be?" That is a question man has been asking himself since the dawn of human thought. It is a question with many facets to its answer, and one of the major ones, without doubt, is the action of the endocrine glands. If you consider how much of the physical and mental activity of man is controlled or influenced by hormones, you can see that this system plays a vital role in determining what an individual will be, how he will react to a situation, and how successfully he will meet the stresses of living. Personality traits and mental function are not the province of the nervous system alone.

Ruthann LeBaron
(1972, p. 168)

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ACKNOWLEDGMENTS

The experience of researching and writing a Ph.D. dissertation is a learning experience that can teach its author many lessons. Perhaps one of the more enduring insights that I have gained is the realization that what may often appear as an individual accomplishment is most likely attributable to a network of social relationships. The lesson, then, is one of humility as nothing belongs to any one person.

Though this dissertation has but one recognized author, its contents are a product of informal and formal relationships between myself and the members of the dissertation committee. Louis Dotson, the committee chairman and my major professor, has unknowingly ascribed to my ideal conception of a teacher and of a friend. His continuing support and encouragement have allowed me to explore intellectual avenues I would never have thought possible. His commitment to excellence has inspired me to pursue an uncompromising view toward my future endeavors.

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If there is any one person to whom this dissertation should be dedicated it is to Pat, my wife. Her understanding and emotional support have been the cornerstone of my life. Our relationship is my enduring source of strength and it is to her that I am most committed.

ABSTRACT

Social psychological and the sparse hormonal literature are reviewed for possible commonalities with respect to alcohol consumption and alcohol-related problems. Self-concept, social anxiety, cortisol, and testosterone are proposed as interrelated but additive predictors of alcohol consumption among males in a party-type social setting. The relationships were thought to be amplified for those persons with a self-reported history of excessive drinking.

Sixty-five male collegians from four organizations were invited to attend parties sponsored by the research co-directors. Pre- and post-drinking venipunctures were taken but the subjects were not told of the specific interest in the steroid hormones. Further, the subjects were not encouraged or discouraged to drink alcohol and alternative beverages were available. Factor analyses of items taken from questionnaires were used to develop self-concept and social anxiety measures. Assays of pre- and post-drinking hormone levels and blood alcohol concentrations were done by three independent laboratories. Methodological considerations for the research are discussed.

After taking into account the reported behavioral history of the subject with respect to alcohol-related behavior, the proposed variables explained approximately 40 percent of the variance in alcohol consumption. An intensive analysis of the data suggested that an inconsistency between cognitive and behavioral dimensions of self-concept, combined with higher levels of social anxiety and pre-drinking cortisol, were

associated with alcohol consumption among those classified in the excessive drinking category. The observed increase in post-drinking cortisol, combined with indications from the literature that adrenal activation is associated with the enhancement of anxiety, led to the speculation of an anxiety syndrome among excessive drinkers. Moreover, it was posited that for some persons the temporary anesthetic effect of alcohol ingestion may be offset by unanticipated consequences. One result might be the reactivation and, perhaps, heightening of the precursors of situated drinking. In the discussion it was noted that the antecedents of excessive drinking might involve particular occupations as well as social psychological factors. In general, it was noted that the often called "addiction" to alcohol might be better characterized as a syndrome that entails physiological conditioning, psychological expectations, and social behaviors.

Basic and applied implications of the findings are discussed. The general conclusion is that the study demonstrated the utility of incorporating social psychological and biological variables and that the comprehension of human behavior, particularly with reference to health-related problems, will not be forthcoming without continued efforts to conceptualize research, and interpret the complementary nature of such variables.

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CHAPTER I

INTRODUCTION

> I am not suggesting that social psychologists should suddenly forsake verbal and behavioral measurement techniques. However, tapping the subject's psychological tension level may provide useful supplementary data. . . . If we can demonstrate that the end effect predicted by the theory was preceded by differential states of arousal, we can better establish a more convincing case for a particular hypothesis. Such gauging of the intervening process with physiological measurement is not absolutely necessary, since, if the prediction is confirmed, support is lent to the theory being tested. However, responses that reflect some intervening process may help us either to rule out alternative interpretations or to reinterpret the data if the original hypothesis is disconfirmed (Gerard, 1964:46).

Concern with such psychological and biological interactions dates to the beginning of scientific interest in human social behavior.[1] Historically, research incorporating both types of variables has been sporadic. Furthermore, it is only in the last decade that social psychologists have begun to seriously consider biological factors in the construction of their theories.[2]

Divergent positions exist with respect to the inclusion of biological variables within the domain of social psychology. In many cases the variables are so underplayed that they have effectively been assumed

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[1]For brief accounts of the history of psychobiological interests in social behavior, see Shapiro and Crider (1968), Mueller (1970), and Henry (1967).

[2]The works of Sherif (1935), Asch (1951, 1952), Funkenstein, et al. (1957), Seyle (1950), Cattell (1962), Schacter (1964), Back and Bogdonoff (1964), and Dotson and Robertson (1969) are notable exceptions to this observation.

away. Consciously or unconsciously, social scientists have sustained a Cartesian dualism of mind and body (cf. Moss, 1973:Chapter 1).

One speculation for this observation is that sociologists and social psychologists have eschewed biological variables because of meta-theoretical implications for Social Darwinism and Nazi Racism (Mazur and Robertson, 1972:Chapter I; Mazur, 1973:525). Preoccupation with the philosophical issue of reductionism also has contributed to such neglect.[3] Gerard (1964:43) has noted that the recent modification of this trend in social research might be attributed to social psychologists' "growing dissatisfaction with total reliance upon the verbal reports of subjects; (and, to) a developing concern with intra-individual processes." Another plausible explanation is that researchers have only recently acquired reliable techniques for the measurement of key physiological variables.[4] Certain, too, is the fact that multi-disciplinary efforts often receive more "lip-service" than actual support.

Whatever the reasons for these apparent trends, it should be recognized that any research scientist is committed to the pursuit of knowledge and understanding. Consequently, one is hard put to refute Mazur and Robertson's observation that:

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[3]The reader should consult Nagel (1961:336-397) for discussion of the general issues associated with the reduction of theory to varying levels of analysis.

[4]Recent dramatic developments in the measurement of steroid hormones are discussed in Lunde and Hamburg (1972), Vestergaard (1968), and Mason (1968a). An example of the early frustration with measurement techniques is found in Cannon (1922-23). This notion of recency of measurement techniques is also discussed by J. V. Brady (1967).

> the credible scientist builds theories which are accurate predictors of the phenomena in question. To ignore a possible major contributing factor may result in a theory which is not predictive. To ignore biological contributions to behavior because of the past is foolish. For scientists, political leaders, or others to infer that people should live or die or have special privileges on the basis of such criteria, or any criteria, is to make a value or politically calculated judgment, not to state a scientific conclusion (1972:4).

I. STATEMENT OF THE PROBLEM

The present study is concerned with social psychological and hormonal correlates of alcohol consumption among males in a social setting. In particular, the focus is on self-concept factors and two steroid hormones, testosterone and cortisol. Self-concept is viewed as a multi-domensional construct which includes "self-esteem" and "self-evaluation." The construct "social anxiety" is introduced as a conceptual link between self-concept and the selected steroids.

While no literature was found which relates directly to the specific research topic, a conceptual scheme is presented which attempts to integrate indirectly related and often tangential research findings into a quasi-explanatory sketch. This sketch is used to sensitize the analysis to the possible interrelationships that are suggested by prior research. The proposed variables are then viewed simultaneously in an effort to predict alcohol consumption. Pearson's r correlations are analyzed as an initial step to the predictive portion of the study.

II. ORGANIZATION OF THESIS

The literature relating self-concept and associated constructs with alcohol-related behaviors is examined in Chapter II. A general

background to the selected steroids is presented in Chapter III. The sparse literature relating cortisol and testosterone with alcohol consumption is also reviewed in that chapter. Chapter IV includes a discussion of the conceptual frame and the particular avenues used to guide the analysis. Methodological considerations are elaborated and discussed in Chapter V. The findings are presented in Chapter VI in conjunction with a proposed interpretation and a general discussion that includes implications for further research. The concluding chapter, Chapter VII, is a general overview of the thesis. Included in this overview is a synopsis of each of the previous chapters as well as the general conclusions of the author.

III. GENERAL EXPECTATIONS

Since this study is descriptive in nature and the design is non-experimental, no actual tests of the guiding propositions are implied. It is anticipated, however, that the incorporation of social psychological and biological variables may have basic and applied implications that might otherwise go unexplored in the absence of either set.

More generally, it is expected that the findings of this study will provide an empirical basis for movement in the direction of a hypothetico-deductive theory of alcohol consumption. However, the present level of knowledge with respect to the interrelationships of sociological, social psychological, biological variables and alcohol consumption significantly restricts the scope of any one study. Consequently, it is thought that the present study will provide an initial basis for further study by generating a quasi-explanatory sketch which

is based on the empirical observations of this study. Equally important at this stage of development is the anticipation that the research will demonstrate the utility and worth of incorporating social psychological and biological variables in one's efforts to understand human behavior.

While the exploratory nature of this study technically limits empirically grounded implications to male drinking in party-type social settings, speculations about the implications for a psychobiological syndrome associated with excessive alcohol consumption are discussed. These speculations include implications for (1) the study of excessive alcohol consumption in general, and (2) the therapeutic implications of a multi-disciplinary approach to alcohol-related problems.

CHAPTER II

LITERATURE ON SELF-CONCEPT AND ALCOHOL-RELATED BEHAVIOR

The empirical literature on self-concept and alcohol consumption encompasses a broad spectrum. This includes studies of confirmed alcoholics, rehabilitated alcoholics, adolescent drinking, and of excessive drinking and alcohol abuse in general. Further complicating the matter are the conceptual, definitional, and methodological debates within the literature. Particularly pronounced are the issues of: (1) the reality or unreality of an "alcoholic personality" (cf. Sutherland, et al., 1950; Syme, 1957; McCord and McCord, 1960; Blum, 1966; and Bejerot, 1972); (2) the disease or medical approach versus a psychological or social psychological definition of "problem drinking" (cf. Jellinek, 1960; Lucia, 1963, especially Part 5; and Robinson, 1972); (3) the use of nomothetic versus idiographic research designs (cf. Rossi and Nathan, 1969); and (4) the lack of definitional consistency of constructs such as "problem drinker," "heavy drinker," "alcohol abuser," and "alcoholic person." Consequently, the literature examined in this section is eclectic in nature. The aim is to extract consistencies from a multiplicity of empirical findings that might have

commonalities with findings on hormonal relationships to alcoholic consumption.[5, 6]

The meta-theoretical assumption of this study is that self-concept is a construct indicative of the way in which persons conceptualize their thoughts, behaviors, and acts. This view implies that measures of self-concept are reflective of the way in which an individual identifies and contrasts their own entity relative to other persons. Explicit in this approach is the assumption that one's self-concept is a partial determinant of overt behavior and thus an important construct for understanding human behavior. In general, it is assumed that persons have and can express their view of self and that self-concept is measurable (cf. Gordon and Gergen, 1968:Part I).[7]

I. LITERATURE REVIEW

A pervading issue in the literature has been the search for an "alcoholic personality" (cf. Landis, 1945; Armstrong, 1958; and McCord and McCord, 1960). The research is often heavily influenced by a psychoanalytic perspective. To date no consistently pure personality traits

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[5]Social researchers have done extensive work in the general area of alcohol abuse and alcoholism. A completely exhaustive literature review is far beyond the scope of this study. While an effort was made to include some literature with conflicting findings, the reader should keep in mind that this section is devoted to a search for consistencies which would suggest propositions worthy of exploration.

[6]Due to a paucity of literature on non-alcoholic drinking behavior and self-concept, and the abundance of research on "alcoholics" much of the literature in this section is based on studies of alcoholic persons. However, the use of such studies for conceptual support does not imply that an attempt is being made to define an "alcoholic personality."

[7]For collateral support of this perspective and its assumptions,

and/or patterns have been isolated which would allow for prediction of excessive users of alcohol or potential alcoholics (cf. Reaves, 1964). The study of self-concept in relation to alcohol consumption has also been extensively researched. Though no consensus as to the nature of the relationship exists, a general theme is that persons with low self-concepts are more likely to use alcohol excessively.[8]

Wahl (1956) has suggested that low "self-regard" is important in the early diagnosis of alcoholism. Recognizing his own methodological flaws he concluded that the meager support provided by his findings was, at best, suggestive.

McCord and McCord (1960, 1962) presented more substantive evidence from the results of their longitudinal study. Focusing on latent patterns they concluded that "in childhood, the alcoholics exhibited several traits--apparent fearlessness, self-sufficiency, and aggressiveness which, in our society are generally regarded as being masculine" (1962:428).

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the reader should consult Strong and Feder (1961), Wylie (1961), Kinch (1963), and Vanderpool (1968).

[8]The terms problem drinker, heavy drinker, alcohol abuser, and "alcoholic" add to the conceptual ambiguities of studies dealing with alcohol-related behaviors. Furthermore, the connotations of such terms may be culturally defined. The use of the term "excessive alcohol consumption" in the present study also has its limitations. It is recognized that the definition and connotation of the term could conceivably vary by person and/or situation. Nevertheless, the term will be used to indicate that some persons' historical use of alcohol is to a greater degree than other persons. A specific operational definition and clarification is presented in the chapter on Methodological Considerations.

In general, however, they concluded that pre-alcoholics were characterized by a dependence-independence conflict. Lishansky (1960) further analyzed the McCords' findings and theorized that pre-alcoholics eventually resolve the conflict in favor of dependency on others and the belittling of one's view of himself.[9]

Ralph Conner (1960) concluded from his study that it is the lack of self-integration and personality organization that characterizes alcoholics and excessive users of alcohol rather than a low self-concept per se.[10] He maintains that "it would not seem amiss to suggest that the search for the "alcoholic personality" has partaken of the nature of the examination of the elephant by the five blind men" (1960:466). It is noteworthy that Conner reported a marked concern with the maintenance of primary relationships among the subjects of the study.

Williams (1967a, 1964), in contrast to the McCords, Conner, and Lishansky, found that a sample of college problem drinkers were characterized by independency and self-sufficiency. These reports were complemented by reports of aggressiveness and a desire for novelty and variety in experience. Williams (1967a:273) also noted that "problem drinkers score significantly lower on self-control." These observations were interpreted as implying that "problem drinkers" are probably not well-equipped to participate in the primary groups in which they desire to be.

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[9]For additional empirical support on this "dependency syndrome" in problem drinkers, see Toker, et al. (1973), Overall (1973), Overall and Patrick (1972), Gross and Carpenter (1971), and Gross and Adler (1970).

[10]For similar conclusions see Marcus (1969).

The relevance of these observations is that college problem drinkers, in reporting their preoccupation with primary groups, might be reflecting a concern with awkwardness in social situations rather than a pure "dependency syndrome" as is suggested by the psychoanalytic writers, e.g., McCord, et al., 1960.

More recent studies have expanded Wahl's initial (1956) observations on the relationship of self-concept and excessive alcohol consumption. Berg (1971) found that self-concepts of alcoholic persons were lower than those of non-alcoholic persons and that after drinking the alcoholics' scores improved while scores of non-alcoholics worsened. Similar results were obtained by Gross (1971).

Partington (1970) used a multi-dimensional technique for scaling "self-evaluation." His findings supported the notion of a "dualistic" self where problem drinkers were more positive toward their "high" self than their "sober" self. McGuire, et al. (1966) reported similar findings.

In contrast to Partington's interpretation Vanderpool (1968:72) concluded that "drinking does not enhance his [the alcoholic's] self-esteem but undermines his already poor sober self-concept." He (1968: 75) maintains that those with poor self-concepts are likely to compensate by trying "to become more adaptable and pleasing to others." Furthermore, Vanderpool interprets this behavior as a means of manipulating others such that they will bolster one's depreciated view of

self.[11] Button (1956:454) is even more affirmative with his interpretation: "They are often true 'egotists' in the sense that others, for them, exist to serve and succor . . ."

Williams (1966) found that college drinkers in a relatively natural party setting reported decreased psychological anxiety and decreased depression, i.e., an anesthetic effect, with low levels of alcohol consumption (from four to six ounces). Among those who consumed at least eight ounces, however, these findings were reversed, i.e., psychological anxiety and depression increased. Recognizing the limitations on inferences drawn from his non-experimental research design, Williams could only speculate on a type of "anxiety syndrome" that he thought would explain his unusual findings. He maintained that:

> Although the data of this study cannot account for excessive drinking, it remains possible to consider what psychodynamic functions alcohol serves for problem drinkers which it does not also provide for nonproblem drinkers. . . . It appeared, that under alcohol, problem drinkers became more nearly "normal" on anxiety and depression; that is, closer to what nonproblem drinkers were like in a sober condition. It is reasonable to assume that persons with relatively high amounts of anxiety and depression appreciate the relief afforded by the decreases in anxiety and depression under alcohol more so than persons characterized by normal amounts of these variables, and that they may tend to drink frequently in order to obtain this temporary relief. In short, it would seem that the motivation for drinking would be stronger and more insistent for problem drinkers, a condition which may have contributed to their becoming problem drinkers and may eventually lead to their becoming alcoholics (1966:692).

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[11] On the basis of such findings as reported by Vanderpool (1968), G. Bateson (1971) has presented a "cybernetic" theory of self and alcoholism. In effect, he maintains that the alcoholic comes to define his "high" condition as the "proper" state of mind.

II. ALTERNATIVE PERSPECTIVES[12]

Some recent studies (Cisin and Cahalan, 1971:806; and Cahalan, 1972) take the position that people (at least in the United States) tend to "move into, or out of, problem drinking status." From this episodic perspective it may be reasonable to anticipate synchronic correlations at one point in time which would not necessarily predict behavior through time.

One example of such an approach are the studies by Peter Park (1958, 1962). He investigated the relationship of role structuring to alcohol abuse. With a quasi-experimental design comparing alcoholic to non-alcoholic persons he found some empirical support for possible relationships between "incipient" or problem drinking and propensity to become alcoholic. In general he concluded that it was the pattern of adjustment to role demands that induced a problem drinking profile. Moreover, role ambivalence makes it difficult for the person "to fit into most social situations with ease" (Park, 1962:452). From this finding he inferred that, over time, "it is not just drinking, nor even drinking to reduce tensions in general, but drinking to relieve particular types of tensions arising from particular situations, that leads to alcoholism" (1962:452).

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[12]For additional approaches to the study of excessive drinking among youth not discussed in this section see Straus and Bacon (1953), Bruun (1959), Alexander and Campbell (1966), Blane, et al. (1967), and Jessor, et al. (1968), MacAndrew and Edgerton (1969), Straus (1973, 1974), and Bacon (1973).

A more recent development in the personality-alcohol literature builds on an hypothesized "need for personalized power" by individuals. This view posits that alcohol is used "as a means of feeling strong, overcoming feelings of weakness" (McClelland, et al., 1972:302). Thus, while other intra-personal conflicts may arise, the focus is on "power conflicts" (1972:302) and not directly on self-concept.

Summarizing and synthesizing over 10 years of research on drinking behavior, McClelland (1972:314-15 and 316-31) maintains that this approach provides an empirically supported theoretical scheme on which to generate therapeutic treatments for any person who drinks alcohol to excess. The therapeutic model involves socializing persons to satisfy their "power needs" by modes other than alcohol (e.g., teaching people to produce fantasies of an "achievement-oriented nature").

The empirical studies included in the monograph encompass numerous research techniques. Many of the projects utilize projective tests, e.g., TAT tests.[13] Considerable weight, however, is placed on a research project by Rudolph Kalin (1972) for support of McClelland's schema.[14, 15]

Kalin's research (1972:217) "explores the relationship between self-descriptions and heavy drinking among college students." While the

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[13]For a critique of projective testing in the alcohol-personality literature, consult Sutherland, et al. (1950), and Syme (1957).

[14]For examples of the reliance on this work, see McClelland, et al. (1972:230-231, 288-290).

[15]Though this article is central to the "personalized power thesis" it is not to be taken as a crucial test of the hypotheses.

author recognizes that differences may exist between "heavy drinkers" and alcoholic persons, his bias is clearly in the direction of defining an "alcoholic-prone personality." A special scale was developed and administered to a sample of 118 college males. A factor analysis yielded three rotated factors which were identified as (1) "assertive antisocial behavior;" (2) "lively social presence;" and (3) "adherence to order." The factors were then correlated with self-reported drinking behavior.

Kalin's findings yielded correlations consistent with several other studies using similar measurement scales.[16] The results led him (1972:226) to characterize college-age heavy drinkers "as having tentencies for anti-social behavior and a lively social presence, and as lacking order." The "lacking order" factor included items demonstrative of impulsivity, persistence, immediate self-denial (delayed gratification), and flexibility in adjusting to new situations. These findings have been partially replicated by Williams and associates (1971) in their study of alcoholics and self-reported "heavy" drinkers.

Kalin interpreted these factors as lending strong support to the "personalized power hypothesis." He (Kalin, 1972:231) concludes:

> Heavy drinkers display interpersonal relationships characterized by aggressive ascendancy and narcissistic sociability, and their intrapsychic functioning shows lack of order. Such conclusions support the theory of drinking proposed in this

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[16]For comparison see Williams (1967), Jones (1965), Siegman (1966), MacAndrew and Geertsma (1963), Schulman (1951), Machover and Puzzo (1959), Lentz, et al. (1943), and Halpern (1946).

volume. Aggressive ascendancy and narcissistic sociability can be considered a manifestation of the need for power, whereas a lack of order can be subsumed under the concept of lack of inhibition.

III. SUMMARY

Though theoretical perspectives and rationales differ in the literature, several empirical generalizations may be gleaned about persons who use alcohol excessively. For one, excessive users of alcohol are often ambivalent as to "self-esteem" or "self-regard." While often negative and self-debasing in thought, excessive users of alcohol may report behavior which is socially assertive or aggressive. Moreover, consistency across dimensions does not appear to be imperative. These observations appeared to be independent of particular research designs or measurement techniques.

Several studies reported that persons who used alcohol excessively were disorderly in managing their personal lives, e.g., maintaining friendships. This observation was often interpreted by psychoanalytic researchers as a lack of self-control. This "lack of order," however, could be indicative of the ambivalence sometimes observed across different dimensions of self-concept.

It was noted that some persons who report excessive use of alcohol express a preoccupation with social acceptance. These reports are often coupled with expressions of uneasiness in social situations and/or self-descriptions of "lively" or party-type behavior at social gatherings. Such behavior could be a reflection of uneasiness or anxiousness with respect to social interaction as well as an indicant of concern

with social acceptance or "social desirability."

Research about independence of self or dependency on others is inconclusive. Complicating this dimension is the fact that both viewpoints use psychological "compensation" or psychological "defense" mechanisms as theoretical justifications for their empirical findings.

CHAPTER III

STEROID HORMONES AND BEHAVIOR

I. GENERAL BACKGROUND[17]

Hormones are substances which are circulated throughout the body by the bloodstream. They are the product of specific glandular structures (endocrine glands) which have no secretory ducts; hence the name "ductless glands." Steroid hormones are particular types of organic compounds characterized by a similar chemical ring structure (fused) and include various sex-related secretions. The secretory source of steroids include the adrenal cortex, the testes, and the ovaries.

The history of hormone research on behavior dates to 1849. Berthold's initial experimentation with roosters demonstrated that "something produced in the testes caused a cock's comb to grow." While research on hormones did not attract much attention until the early 1900's, the last decade has yielded a virtual research explosion for neuro-endocrinological relations to behavior (cf. Brady, 1967; Astwood, 1972; and Levine, 1972).

It is noteworthy that most all of the research in the field has a strong behavioristic bias and is often atheoretical (cf. Fischer,

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[17]This section is a cursory overview of the significant impact that hormones have on human and animal behavior. For a more explicit account of the subject see Brown and Barker (1966), Michael (1968), Swain (1969), Connel, et al. (1971), Levine (1972), and Mazur and Robertson (1972).

1970:Chapter 4). This orientation is perhaps attributable to the medical emphasis on homeostatic relationships among hormones, chemical cellular structures, and the nervous system (cf. Mazur and Robertson, 1972:93). The little cognitive research that has been done appears to be a product of psychiatric explorations (Mason, 1968b:584-585). Another tactic has been the examination of relationships among hormones, aggression, and stress (cf. Lunde and Hamburg, 1972). While some work has been done on the relationship between hormones and alcohol consumption this specific area has yet to be adequately explored (cf. Mello and Mendelson, 1971:Session 1).

Two of the more extensively studied steroids are testosterone and cortisol. In addition to their relationships with an array of sex-related behaviors, researchers have found relationships between these two hormones and a multiplicity of behavioral patterns ranging from aggression to status hierarchies. The breadth of such evidence makes testosterone and cortisol two prime biological candidates for study in relation to alcohol consumption.

II. TESTOSTERONE AND SOCIAL BEHAVIOR

General Background

Testosterone is the principal androgen secreted by the human body. Generally referred to as the "male hormone," it is also found in females in lesser concentrations (approximately one-sixth). The production of testosterone includes gonadal and adrenal functions. Testosterone is also reported to have a relatively small but consistent diurnal change, peaking in the early morning and having its low range between 6:00 P.M.

and midnight (cf. Rose, et al., 1972a).

Research on animals has isolated testosterone as a potent influence on behavior. Lutte (1972) was able to initiate and repress intermale fighting behavior between "castrated mice" by experimental testosterone treatment. Lincoln, Gurness, and Short (1972) were able to manipulate rutting behavior of red deer stags with injections of testosterone. They (Lincoln, Gurness, and Short, 1972:375) concluded "testosterone has a direct inductive effect on socially aggressive behavior, which can be induced at any season of the year." Davis and Gandleman (1972) found that an increase in testosterone dosage was associated with an increase in pup-killing among ovariectomized adult, virgin mice. Campbell and McGill (1970) reported that when neonatal male mice were treated with testosterone they [the mice] ejaculated at a much earlier age than a control group.[18]

More directly relevant for human social behavior is the work of Irwin Bernstein and his associates (Rose, Gordon, and Bernstein, 1972). Their experimental findings present cumulative evidence of a consistently positive relationship between social status, dominance, and testosterone among male primates. Further, these studies demonstrate the extent to which testosterone levels may be altered by changing events within the social hierarchy.

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[18]Similar research reports of the extensive impact of testosterone on behavior in animals may be found in Whalen (1967).

The most fertile area in human testosterone research has been in the general area of aggression and stress. Rose, et al. (1969) found lowered rates of testosterone among new army recruits and among Special Forces personnel anticipating imminent combat in Vietnam. Rose attributed this finding to psychological adaptation to threat. Persky, et al. (1971) found a positive multiple correlation (r = .90) between testosterone production rate and four pencil and paper measures of hostility and claims of aggressive behavior. All the subjects were males under 30 years of age. Kruez and Rose (1972) were unable to replicate this finding in their study of a prison population. After examining the case histories of the sample, however, they proposed a hypothesis suggesting that testosterone may be an important additional factor in the comprehension of antisocial behavior.[19]

Testosterone and Alcohol Related Research

Complementing the research findings on the relationship between testosterone and antisocial or excessive behavior are two studies relating testosterone to alcohol.[20] Some of the literature dates to 1949 when several physicians were postulating hormonal-addiction hypotheses

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[19]For additional research reports on the relationship among testosterone, anxiety, stress, and hostility see Jackson (1962), Jackson and Burke (1965), and Lunde and Hamburg (1972). For research relating testosterone to human cognition see Andres (1972:especially 200-205). Recently, Ewing (1974:207) has suggested that free-circulating testosterone might be related to the different reactions to alcohol across ethnic groups.

[20]Most all the research on this dimension is concerned with alcoholism. While alcoholism per se is tangential to this study, the literature is reviewed for possible social psychological implications.

for alcoholism (cf. Goldfarb and Berman, 1949; J. Smith, 1949, 1950a, and 1950b). It is only recently, however, that researchers have pursued hormone research in relation to the etiology of alcohol consumption and/or alcoholism. It is suspected that the scarcity of research in this area may be attributable to the belated development of reliable measurement techniques.

The studies done to date are retrospective in design. That is, they tend to explore synchronic differences between alcoholics and non-alcoholics or simply correlates among alcoholic persons. The implicit assumption is that differences in hormone concentrations or hormonal reactions may illuminate possible precursors of excessive alcohol consumption that may have implications for future "problem drinking." Due to the methodological limitations of the studies to date no causal primacy can be demonstrated. Further, it is quite possible that factors associated with excessive alcohol consumption may change through time. Moreover, the general speculation is that the causes of excessive alcohol consumption are functions of some type of interaction between physiological and social psychological factors (cf. Reaves, 1964).

Researchers have found testosterone among alcoholic persons to be both higher and lower than the "normal range." Fabre, et al. (1973) found that in 25 to 45 year old chronic alcoholic male volunteers (N=10)[21]

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[21]The total sample included 20 males. However, the reported data are based on 10 alcoholic males who abstained during the time period. No significant differences were reported between the 10 abstaining alcoholics and 10 alcoholic males who drank alcohol.

from a penal institution, average daily urinary testosterone glucuronide (a testosterone metabolite) was four times as high as the concentrations in a noninstitutionalized control group. Their testosterone averaged 153.08 mg/24 hours compared to 36.7 mg/24 hours in male controls and 6.38/24 hours in female controls. Of the 10 male alcoholics only one had a testosterone glucuronide concentration as low as the highest control subject. Conceivably, these differences could be an artifact of the status differences among the individuals (cf. Rose, Gordon, and Bernstein, 1972). Likewise, incarceration is an event that precipitates exposure to a new "risk" structure for experience and this process could contribute to altering an otherwise "normal" level.

Mendelson and Mello (1973) have reported ambivalent findings. They found plasma testosterone concentrations to be <u>above</u> normal in 20 to 47 year old male alcoholic subjects (N=8). These subjects had histories of violent and aggressive behaviors. It is noteworthy that they reported a <u>decrease</u> in testosterone concentrations among a subset of the subjects who participated in an experimental drinking situation. These subjects were not allowed alcohol for six to seven days and then permitted up to 32 ounces for 12 days. Plasma testosterone was measured each morning (0930) and blood alcohol was measured four times a day. The resulting correlation showed a significant inverse correlation between testosterone concentration and blood alcohol concentration. However, the decline in testosterone appeared to begin before ethanol was consumed by some subjects. During a five-day post-drinking period the testosterone levels returned to the pre-drinking values.

The diffuse results of these studies are subject to a number of interpretations with respect to behavioral implications. For one, the observed inconsistencies could be methodological artifacts. That is, each of the studies reported used different assay techniques, different sources for measurement (urinary versus blood), different points in time to assess concentrations, and mostly institutionalized alcoholic persons as subjects. Given that males have been reported to have a relatively stable diurnal pattern of plasma testosterone (cf. Rose, et al., 1972a), the time variations could account for the differences reported in these studies.[22] Secondly, physiological changes resulting from extended alcohol consumption could alter testosterone catabolism. Altered sexual activity or heightened anxiety and stress, perhaps as a result of incarceration, could affect testosterone production. The subjects' historical experiences of violent and hostile behavior could contribute to altered physiological states. Nevertheless, it may well be that testosterone is an additive, or, perhaps, multiplicative determinant of antisocial behaviors, anxiety, and/or hostility and could be a possible factor contributing to the excessive consumption of alcohol.

A factor not examined in these studies was the change in testosterone concentrations before and after exposure to alcohol. Studies of other hormonal correlates of behavior (cf. Davidson, 1972:80) suggest that certain hormones may indeed have a primer effect which is released only after exposure to some stimulus, e.g., alcohol ingestion.

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[22]Diurnal patterns are discussed further in Section II of Chapter V. For a tabular comparison of the studies see Table 6 in Appendix A.

Moreover, since initial concentration rates vary interpersonally, change may be an indicant of overall activity of the associated endocrine gland. The inclusion of this variable also allows for examination of change in either direction--from lesser to greater concentrations or vice-versa.

III. CORTISOL AND SOCIAL BEHAVIOR

General Background

Cortisol is a steroid hormone associated with the adrenal cortex. The adrenal cortex is located on the top of each kidney. The adrenal was first described by Eastachius in 1563. In 1849 and 1855 Addison described Addison's disease and the associated adrenal destruction. It was not until the 1920's, however, that hormonal secretions of the adrenal cortex took on special significance for behavioral scientists.

In the last 30 years some 50 different adrenal steroids have been isolated. Three have been shown to be of vital importance to human life.[23] These are cortisol (hydrocortisone or Compound F), corticosterone (Compound B), and aldosterone. A convenient neologism for all of them is "corticoid." Cortisol is secreted episodically with peaks at the early morning rise, noon, and 4:00 P.M. In general, the low ranges of cortisol occur between 6:00 P.M. and midnight (cf. Rose, et al., 1972a).

Cortisol is often referred to as the "stress hormone." As Connel, et al., explains:

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[23]For an elaboration of the biological importance of these secretions for the maintenance of life, see LeBaron (1972:65-66.

> In some not clearly defined way, cortisol prevents death and helps the human organism to respond appropriately to stress. The stress that elicits a cortisol response may be either physical or psychic.
>
> Additionally, in the absence of cortisol, patients may develop serious emotional difficulties ranging from depression to psychosis (1971:67).

A diversity of behavioral effects of pituitary-adrenocortical hormones has been reported (cf. Levine, 1971; and Mason, 1968a, b, c). These range from stress-induced to avoidance response behavior in animals. More recently, Miyabo, et al. (1972) have found a positive relationship between cortisol dosage and exploratory behavior in rats. Mason, et al. (1973) found significant mean elevations of plasma cortisol levels prior to the onset of the first exhausting exercise for 16 male volunteers, 20 to 24 years of age. This finding lent support to the presence of psychoendocrine responses to psychological stimuli, e.g., cognitive anticipation.

Tennes and Carter (1973) reported that cortisol correlated closely with behavioral states of infants. "Low cortisol levels were found to be associated with the sleep state and high levels with a period of fussiness or crying with little overlap between the two groups" (Tennes and Carter, 1973:128).

Some few studies have explored the possible involvement of personality characteristics in psychoendocrine response. These include Fiorica and Muehl (1962), Sholiton, et al. (1963), and Tècce, et al. (1965). While the findings of these studies do not appear to be cumulative, there is some support for a positive relationship between elevated cortisol levels and anxiety, hostility, and/or defensiveness.

One example of research relating cortisol levels to psychological factors is the work of Wolff, et al. (1964). Their studies included the parents of 31 children known to be suffering from fatal illnesses. On the basis of a derived measure of the "effectiveness which a parent guards against the threat of loss," they made predictions of mean 17-OCHS (hydrocortisone) excretion rates. For mothers the correlation coefficient between the predicted and observed rates was .41 and for fathers the correlation coefficient was .80. The general conclusion was that persons with weaker ego defenses showed greater adrenal activity than persons with stronger ego defenses when exposed to certainty of impending loss. The general implication is that adrenal activity is not solely a function of perceived environmental threat and that psychological activity may be an important source of adrenal control.

Mason (1968b) has reviewed most all the relevant studies exploring the relationships between cortisol response to psychological influences. He comments that:

> In general, then, studies with human subjects provide support for the conclusion that 17-OCHS levels sensitively reflect psychological influences. Pituitary-adrenal cortical activity is increased under conditions in which there appears to be a rather undifferentiated state of arousal, alerting, or involvement--perhaps in anticipation of activity or coping. The elimination of physical variables from the experimental conditions by many different approaches, along with the repeated demonstration of quantitative correlations between 17-OCHS changes and intensity of psychological disturbances, provide convincing evidence of the directness and specificity of relationships between psychological and endocrine factors. The precise nature of the psychological correlates of 17-OCHS response is in need of further study, however, with regard to such issues as, for example, the effect of experiences involving different types of pleasurable arousal, the effect of suppressed versus expressed anger, and the possible application of the concept of object relations (as developed by Engel, 1962) to this problem before general conclusions can be considered firmly established (Mason, 1968b:592).

Cortisol and Alcohol Related Research

To date few relevant research reports are available on the relationship between cortisol and alcohol. Several, in fact, are only tangentially related to cortisol per se in that they assess other adrenal hormones.[24]

Mendelson, et al. (1971:145) reported a persistent "increase in serum cortisol levels in alcoholic subjects (4 males, aged 35 to 45) during a period of 11-29 consecutive days of experimentally induced ethanol intoxication." Extraneous factors were noted which detracted somewhat from the strength of the evidence. In general they conclude that

> ethanol induced an increased secretion of cortisol from the adrenal cortex. . . . [Furthermore,] no evidence of adaptation or exhaustion of cortisol response was found during drinking or after alcohol withdrawal (Mendelson, et al., 1971: 155).

Ogata, et al. (1971) reported similar findings on the relationship between experimentally induced alcohol consumption and epinephrine. That is, as alcohol administration increased, so did epinephrine levels. Their study included four males, aged 37 to 45 years.

Stokes (1973) found a mean increase in plasma 17-OCHS levels among chronic alcoholics during episodes of persistent chronic drinking. This study included 18 alcoholic persons (12 men and six women), with an age range from 38 to 66 years. During the 15 to 20 day episodes blood

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[24]Other studies which report findings somewhat comparable with the studies reviewed in this section include Ellis (1966), Jenkins and Connolly (1968), and Mendelson and Stein (1966).

samples were obtained three times a day, immediately prior to prescribed alcohol dosages at 0900, 1600, and 2300 hours (if a dosage was due). The findings are similar to those of Mendelson and Mello (1971) except that Stokes was able to specify that the elevated levels occurred during the withdrawal phase and was actually somewhat lowered during certain intoxication phases (0900 and 1600). In general he concluded that alcohol appeared to have a temporary anesthetic effect and a delayed but direct stimulating effect on hypothalmic-pituitary-adrenocortical function.

Contradictory findings have been reported by Verdy and Brouillet (1970). On the basis of analyses of five nonalcoholic subjects (three men and two women, aged 29 to 61), they found no support for the hypothesis that ethanol was a stressful stimulus which could activate the pituitary-adrenal axis.[25] The dependent variable in that study was a metabolite of cortisol and was assessed by using daily averages of urinary excretions.

The diffuse findings of these studies are tentative. Nevertheless there is some support for the hypothesis that "a state of adrenal activation occurs as a consequence of prolonged drinking and that each activation is associated with enhancement of anxiety and dysphoric states" (Ogata, et al., 1971:141).

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[25]As with testosterone, only absolute concentrations of cortisol were included in these studies. The examination of absolute changes in cortisol levels might contribute to a better understanding of such variations.

This proposition is consistent with some psychiatric observations of persons who chronically use alcohol but is contrary to popular belief (cf. McNamee, et al., 1968; and Nathan, et al., 1969). That is, excessive alcohol consumption may be associated with the eventual activation of anxiety even though psychological analysis may reflect temporary euphoric relief via the situated anesthetic effect of alcohol. This line of reasoning is consistent with Williams' (1966) observations. It should be recalled that he initially observed psychological relief from reported anxiety with low levels (from four to six ounces) of alcohol consumption. However, among those who consumed at least eight ounces the effects reversed as reported anxiety increased. Moreover, it is reasonable that the increased levels of anxiety are related to adrenal activation resulting from the greater amount of alcohol ingestion.

The simultaneity of psychological anxiety and stress and physiological arousal lends some support to the notion that persons who consume alcohol excessively, alcoholic or non-alcoholic, may

> become progressively more anxious during drinking and also concommitantly show elevations in serum cortisol levels . . . [this] would support the notion of the role of alcohol in inducing or exacerbating emotional stress reactions during chronic alcohol ingestion (Mendelson, et al., 1971:136).

Thus, it is conceivable that alcohol ingestion may have antithetical consequences for the biological and psychological systems. While alcohol may temporarily reduce feelings of anxiousness or uneasiness, alcohol may simultaneously heighten physiological stressors such as cortisol.

IV. SUMMARY

The paucity of research relating alcohol to hormones restricts the empirical generalizations which may be extracted. By extending somewhat beyond the data, however, one may speculate implications which do provide for some consistency. A major limitation of such an approach is that the research reviewed has focused almost exclusively on alcoholic subjects. Consequently, the implications of these findings might prove to be inconsistent with results of research dealing with nonalcoholic males.

It should also be noted that the studies reviewed varied considerably in sample size, age structure, and method of hormone analysis (urine versus blood), and in the time of day that the samples were obtained. They often varied, too, in the procedure for administering alcohol--voluntary versus controlled administration. These alterations further detract from the comparability with the present study.[26]

This is particularly true with respect to the timing of the blood or urine sampling. Since testosterone and cortisol are known to have diurnal patterns, it is possible that none of the studies may be directly comparable as time was unstandardized across studies. Of the studies that reported a particular time for hormonal sampling, none

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[26]As with testosterone, cortisol has a daily diurnal pattern (Rose, et al., 1972). For a tabular comparison of the major studies discussed in this section, see Table 7, Appendix A. Diurnal patterns are discussed further in the chapter on methodological considerations (Chapter V).

reported a time approximating the Friday evening design of this study. Since extended baseline measures were rarely taken prior to the studies it is not possible to be certain that observed changes in hormonal levels are due to alcohol or purely to diurnal rhythm or idiosyncratic fluctuations.

No conclusive evidence yet exists as to the relationship between testosterone and alcohol. Testosterone levels have been observed both above and below the normal range as a consequence of alcohol consumption.

Cortisol was reported to be positively associated with excessive alcohol consumption. A relatively consistent empirical finding was that cortisol was positively associated with anxiety, stress, defensiveness, and/or hostility. The concommitance of these findings suggested that while alcohol ingestion may have a temporary anesthetic effect, alcohol ingestion might also be associated with the reactivation (or emergence) of dysphoric states.

For both steroids it was suggested that future research examine changes as well as absolute concentrations of the particular hormone under investigation. This approach might further elaborate otherwise ambiguous relationships as it would allow for the consideration of change in conjunction with solely pre-drinking or solely post-drinking hormonal states.

In addition, the simultaneous examination of testosterone and cortisol may contribute to a better understanding of the multiplicity of outcomes among hormones and behavior. As Mason explains:

> Most hormones have a broad spectrum or multiplicity of effects, have overlapping actions, and have multiple and

staggered independence. These characteristics taken together seem to suggest a unifying explanation of the modus operandi whereby the many endocrine systems could function as a co-ordinated unit (1968c:796).

CHAPTER IV

CONCEPTUAL FRAMEWORK AND GUIDING PROPOSITIONS

I. CONCEPTUAL FRAMEWORK

In general no consensus of opinion exists as to why some persons drink significantly greater amounts of alcohol than others. The problem becomes more complex when subjects are removed from the "controlled" setting of the laboratory and are exposed to the contingencies of a more natural social setting. Peer group influences (cf. Alexander and Campbell, 1966), role demands (cf. Park, 1962), and situational ambiguity (cf Kinch, 1963) are examples of the numerous variables that may further complicate an already complex phenomenon.

Social scientists have accumulated a sufficient body of research to support the notion that one's self-concept in some way influences drinking behavior. The persistent use of retrospective designs and the relative absence of longitudinal studies clouds the issue of causal primacy. Whether certain patterns of one's self-concept are antecedent to or a consequence of alcohol abuse is not known. The same is true of research relating hormonal variation to drinking.

The focal point of this study is to examine relationships among indicants of self-concept, selected steroid hormones, and alcohol consumption in a party-type social setting. The construct "social anxiety" is introduced in this section as a conceptual link between self-concept and the steroid hormones with respect to alcohol consumption. The conceptual frame is used to suggest guiding propositions for the analysis with the goal being the prediction of alcohol consumption in

that setting. While it is often assumed that persons become "alcoholic" after extended abuse of alcohol, it is not implied that those persons who may be classified "self-reported excessive drinkers" are pre-alcoholic.

A general theme in the literature is that persons who report a derogatory self-concept are most likely to use alcohol excessively. An extended analysis of research findings suggests that the issue is more involved. That is, this "derogatory" approach appears to be only one facet of a multi-dimensional view and might just as well be a consequence of extended alcohol abuse. Furthermore, it was also observed that excessive users of alcohol may report ambivalent views of self--being positive on one dimension while negative on another.

Researchers have found anxiety to be a construct related to both social psychological measures of self and to numerous biological variables, including steroid hormones. Rosenberg (1962) found that self-esteem among 5,000 junior and senior high school students was inversely related to items he thought indicative of anxiety, i.e., self-reports of physical symptoms often associated with psychological anxiety--headaches, backaches, insomnia, etc.

Similar observations were reported by Suinn and Hill (1964). Using questionnaire measures of "self-acceptance" similar in content to Rosenberg's items, Suinn and Hill found negative correlations not unlike those of Rosenberg. Using established measures of psychological anxiety (Manifest Anxiety Scale and Test Anxiety Questionnaire) they reported correlation coefficients of -.68 and -.58 between "self-acceptance" and each measure of anxiety. Both studies concur on the finding that a lower view of self is associated with higher levels of psychological anxiety.

Cattell (1962, 1963) has documented relationships between psychological anxiety and a number of personality measures and several physiological measures. For the purposes of the present research, his findings on anxiety, self-criticism, and steroid hormone levels are particularly relevant. Using factor analysis he reported positive factor loadings for self-criticism and for corticosteroids (17-OH corticoid) on the factor labelled "psychological anxiety" (U.I. 24, cf. Cattell, 1963 and 1962: Chapter 10).

Incorporating these research findings into a multi-dimensional perspective further depreciates the view that it is primarily a debased self-image that precipitates alcohol abuse and/or alcoholism. From the studies noted above it appeared that "anxiety" might be an additive link between self-concept, the steroid hormones and excessive alcohol consumption. Again, a depreciated self-concept could be either a source or consequence of the relationships among these variables. While the measures adopted for this study are thought to be more demonstrative of the construct "social anxiety," i.e., social uneasiness and/or preoccupation with social relationships, than of "psychological anxiety" as used by Rosenberg, Suinn and Hill, and Cattell, it is reasonable to expect similar interrelationships given the social setting of this study. Thus, one may posit that persons with a debased view of self, coupled with self-reported behaviors indicative of "social anxiety," and compounded by relatively higher levels of cortisol and/or testosterone, might find the effects of alcohol pleasurable as well as a convenient means of facilitating social interaction.

Low regard for "self" could be, in part, responsible for the preoccupation with primary group acceptance that is often reported in the literature. To effect extended acceptance in social settings, a person might adopt an assertive, or even aggressive, view of self in these situations. Similarly, a lively, "party-type" social self could be an indicant of those preoccupied with social acceptance. By associating with a variety of groups and using their cumulative support, one could neutralize negative evaluations from some "others" if they occurred.

McClelland, et al. (1972:especially Kalin, 1972) have attributed such self-descriptions to a "need for personalized power." To buttress the "need for power" argument McClelland, et al. (1972:137-8, 281-2) discussed (but did not measure) biological variables. On the basis of vaso-dilation of the blood vessels and possible stimulation of adrenalin secretions they (1972:282) maintain that alcohol ingestion "mobilizes body resources generally, increases alertness . . . [and also] gives a temporary feeling of warmth." From these biological speculations McClelland, et al. state that:

> All of these effects make the person feel temporarily stronger or more powerful. Such feelings may arouse or make more salient whatever power concerns a man has developed over his lifetime. . . . In normal settings, the physiological effects of drinking stimulate socialized power thoughts, which are here assumed to be pleasurable in the sense that men are expected to be strong and assertive. This explains why people like to drink. . . (1972:137, 282).

He then concludes: "So there is ample basis for assuming that alcohol produces a number of changes in the body which ought easily to give rise in men to thoughts about increased power" (1972:282).

The inference from these observations to a biologically reinforced "need for power" is, however, subject to other (though perhaps more humble) interpretations. While this might be true for any hypothetical construct it is particularly pronounced with the amorphously defined and culturally bound construct "need for power." For example, since some of McClelland's (1972:23-24) research settings included exposure of males to females, it is conceivable McClelland's speculations were sex-related testosterone responses (perhaps the "initial feeling of warmth") instead of or in addition to the supposed "need for power."

Some of the literature reviewed suggests a stimulating, non-exhaustive relationship among testosterone, cortisol, and alcohol ingestion. There is also the implication that "social anxiety," a source of which might be a low self-concept, compounds those effects. While a social anxiety perspective might not be mutually exclusive to the "need for power" hypothesis, it is thought that "social anxiety" is a more empirically grounded construct, both psychologically and physiologically.[27]

From a "social anxiety" perspective one could also speculate that those persons with an inflated view of self could also be likely candidates for overly imbibing. Williams' (1966) observations are suggestive of this speculation. In his study alcohol initially suppressed anxiety levels for "heavier drinkers" and at the same time increased anxiety levels for "light drinkers." These observations are in contrast to the

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[27]McClelland, et al. (1972) exclusively studied male subjects. While the present study also includes only males it is thought that a "social anxiety" approach is equally amenable to females and does not suffer from the masculine bias exhibited in McClelland's explications

general view that the excessive consumption of alcohol is for the sole purpose of inflating a low self-concept (although this may be one indirect effect). Moreover, an exaggerated view of self could be a source of social anxiety in that one may find it necessary to use social situations as a source of validating their own self-conceptions (cf. Bateson, 1971).

For excessive drinkers, then, the effect of alcohol in Williams' (1966) study was in some way different in psychological, and perhaps physiological, terms. Given such differential effects it is conceivable that studies which report debased self-concepts among alcoholic persons are measuring a consequence of an historical process. In the beginning alcohol might have been associated with anxiety (psychological and/or "social") but have nothing to do with self-concept. However, through time, one's self-concept might become lowered. This could be as a consequence of the unpleasantries one might experience with prolonged alcohol abuse. Meanwhile, anxiety might be further heightened by a combination of negative social psychological experiences coupled with the physiological effects of prolonged alcohol abuse, e.g., heightened cortisol levels.

Since the data of the present study are based on observations at one period in time, they do not allow for the exploration of changes that may occur through time and space. Thus, to test the existence of such an "anxiety syndrome" might require data on longitudinal "drinking careers." Nevertheless, the delineation of persons with different drinking histories may be important for the present study. That is, the linear relationships

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of "need for power." Furthermore, hormonal variables are amenable to females as well as males (cf. Lunde and Hamburg, 1972).

suggested by the conceptual sketch might be applicable only to particular subgroups. In that case measures on the aggregate would not necessarily reflect differential relationships across subgroups--particularly if the findings for the aggregate are non-monotonic.

The notion of different subgroups as a function of historical experience also has merit for the biological variables. Brady (1967), in summarizing experimental evidence relating emotion to endocrine participation, concluded that

> the critical role of an organism's behavioral history in determining the nature and extent of endocrine participation in affective interactions has been convincingly demonstrated (1967:95).

Moreover, it is suspected that persons with a history of excessive alcohol consumption would more likely be subject to excessive alcohol consumption in a given social situation than persons who do not have such a history.

II. GUIDING PROPOSITIONS FOR THE ANALYSIS

From the literature reviewed and the conceptual scheme discussed in the preceding section, several distinct avenues are suggested to guide the research. Though stated in propositional form, technically they are not hypotheses and no literal tests are implied. Rather, they are used as guides with the goal being an empirically grounded explanatory sketch. This scheme would then be suggestive of implications for additional research, both basic and applied. Given the lack of research relating self, social anxiety, and hormonal factors with social drinking among non-alcoholic persons, this is the most prudent approach.

The proposed relationships between each of the independent variables with alcohol consumption have some empirical support in the literature. There is also support for intercorrelations among several of the independent variables. Some of these proposed intercorrelations, however, are more speculative due to the lack of consistency in the literature. Nevertheless, the proposed intercorrelations are premised on a cursory causal scheme implicit in the discussion. It is reasoned that a low self-concept is one source of social anxiety. Heightened social anxiety is reflected in elevated levels of pre-drinking cortisol and testosterone. Moreover, it is thought that the colligation of these variables are additive predictors of alcohol consumption, particularly among those persons who report a history of excessive drinking. It is anticipated that the simultaneous examination of the independent variables will provide a basis for the explication of this line of reasoning as well as for an evaluation of the predictive worth of the variables.

The guiding propositions were selected on the bases of relative consistency in the literature and from the implications of the preceding discussion. While several speculations counter to the stated propositions were discussed, they are relegated to secondary status for the sake of parsimony. The specification of pronounced relationships for those who have a self-reported history of excessive alcohol consumption is an attempt to determine the importance of this variable with respect to both social psychological and biological variables. Moreover, such a specification is indicative of a first-order interaction effect which was implied in some of the literature (cf. Blalock, 1965).

In general, it is expected that in a party-type social setting with only males present:

1. Indicants of self-concept, social anxiety, pre-drinking cortisol and pre-drinking testosterone are additive predictors of alcohol consumption. Furthermore, each of these variables has pronounced effects for those classified as "self-reported excessive drinkers."

In particular, it is expected that:

2. Self-concept is negatively related to alcohol consumption; social anxiety is positively related to alcohol consumption; and pre-drinking cortisol and pre-drinking testosterone are positively related to alcohol consumption. Furthermore, each of these variables has pronounced effects for those classified as "self-reported excessive drinkers."

With reference to intercorrelations among the independent variables it is expected that:

3. Self-concept is (a) negatively related to social anxiety and pre-drinking cortisol, and (b) positively related to pre-drinking testosterone;
4. Pre-drinking testosterone and cortisol are positively related to social anxiety; and
5. Cortisol and testosterone change are (1) positively related to social anxiety, and (2) negatively related to self-concept.

Corollary: Furthermore, each of these correlations is pronounced for those classified as "self-reported excessive drinkers."

CHAPTER V

METHODOLOGICAL CONSIDERATIONS

I. DATA SOURCE

Research Design

This study used data collected between March 23 and May 15, 1973.[28] Six existent organizations from the University of Tennessee, Knoxville were invited to attend social gatherings sponsored by the research directors. The organizations included four fraternities and graduate students (males only) from two academic departments at the University. The men were invited in groups so that each gathering consisted of friends or associates who were accustomed to being with one another. It was assumed that most had been together at parties prior to the research. The total sample included 91 white males, aged 18 to 32, with group size ranging from 11 to 22.

Each of the separate organizations was approached by a representative from the group who had been contacted by the researchers. Twenty dollars was donated to each group for their participation. No other funds were disbursed to individuals who participated.

The organization's representative informed each participant that they would be required to complete a questionnaire and to have about 50

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[28]The research reported in this study is part of a larger project conducted by Drs. Louis Dotson and Leon Robertson. It was supported by a contract from the Insurance Institute of Highway Safety, Washington, D.C.

ml. (milliliters) of blood drawn from their system.[29] The volunteers were told that the researchers were interested in relationships between factors in the blood and answers to some of the questionnaire items. They were not told of specific interest in alcohol or hormones. Rather, it was explained that it was necessary to have two 25 ml. blood samples and that these must be separated by at least three hours. In the interim the researchers would provide refreshments (including alcoholic beverages), snacks, and games for their amusement. They were neither encouraged nor discouraged to consume alcoholic beverages by the researchers or the organization's representative.

It was emphasized that a volunteer could cease his participation at any time prior to or during the research. Furthermore, each participant was assured that his responses and blood analysis would remain anonymous.

In addition to the questionnaire completed at the social gathering a questionnaire was mailed (with a stamped, self-addressed return envelope) to the participants on the Monday following the Friday evening session. Of the 91 persons in the total sample, 89 completed this second questionnaire. Of those completed, 80 were returned within seven to ten days after having been mailed by the researchers. A single follow-up telephone call elicited six of the remaining nine questionnaires. The three

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[29]See Appendix B for a sample copy of the "Informed Consent Form" used in this study.

remaining questionnaires were returned within five days following receipt of a letter sent one week after the first follow-up phone call. No additional efforts were made to solicit the two unreturned questionnaires.[30]

The six sessions were each held on a Friday evening during approximately the same time period (7:30 P.M. to 11:30 P.M.). The participants were transported to and from the research setting in vehicles hired for the occasion. The gatherings were held in a private hunting lodge (the Tennessee Coon Hunters' Lodge) rented for the sessions. The lodge was located approximately 14 miles from the center of the University. It was a rustic log cabin with a fireplace at one end and had several couches, chairs, and card tables scattered throughout the central area. The structure also included a kitchen separated from the central area by a serving bar.

Each group arrived at approximately 7:30 P.M. Upon arrival the participants were seated and given a name tag with their first name and an identification number on it. Their informed consent forms were also verified at this time. One of the co-directors of the research then welcomed the participants and informally explained the procedure to be followed. This period was also used to introduce the research team[31] and to

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[30]The coding of the questionnaires onto standard codesheets was done by the author and keypunched by a research assistant. To minimize coding error the author compared the completed punchcards with the original questionnaires of each participant.

[31]The research team was composed of the two directors of the research, this author, and three research assistants.

induce a casual atmosphere. The co-director then explained that the questionnaires would be filled out, the blood sample would be drawn, and three hours later, a second blood sample was needed. In the intervening time period the participants were invited to relax and enjoy an evening with their friends. They were told that a refreshment bar providing both soft drinks and alcoholic beverages would be open for the three hours and that party snacks, cards, darts, and other games would be available. The participants were requested not to smoke tobacco until after the first blood sample had been taken and all complied.[32]

The questionnaires, which had been numbered in advance to correspond with an individual's name tag, were then distributed in accord with the identification number of the participant. Those with even numbers were asked to complete their questionnaires while those with odd numbers were being measured for height and weight and having blood drawn.[33] The subgroups were then reversed. The time of pre-drinking data collection ranged from 25 to 45 minutes depending on the size of the group.

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[32]The subjects had been requested by the driver of their vehicle not to smoke tobacco as it violated state safety regulations. Based on the drivers' reports there was general compliance with this request. Furthermore, the research team unobtrusively kept a record of the number of cigarettes and cigars (no other tobacco products were used) smoked by each individual during the three hour interval.

[33]The blood specimens were obtained by venipuncture by two qualified medical technicians who were employed by the University Laboratory. Within about 15 minutes following the conclusion of the pre-drinking and post-drinking stages the blood samples were transported to the University Hospital (approximately 10 miles) where each sample was centrifuged and divided into samples for ethanol, acetaldehyde, and hormonal assays. Samples that were to be assayed in out-of-town laboratories were frozen and packed for shipment.

After the three hour interval blood was taken in about the same order as the pre-drinking sequence. The post-drinking data collection required approximately 15 minutes. Of the 91 participants, one was unable to give blood because of difficulty in finding an easily accessible vein and a second declined to give blood after the party.

Informal debriefing sessions were held after each social gathering. The research team concluded that four of the six sessions approximated a relatively natural party setting. No overt hostility toward the research or researchers was evidenced by any of the groups. There was one incident of hostility between two of the participants but this was brief. In general, the subjects expressed interest in the research and seemed amicable toward the researchers. This was perhaps due to the fact that the research team circulated among the participants, often becoming involved in card games, dart games, etc.

The exceptions to the "party" atmosphere included both groups of graduate students. One group appeared to be inhibited in their consumption of alcoholic beverages. Casual conversation with one of the participants revealed that a possible explanation for this observation was that some of the participants had expressed concern about the limited amount of alcoholic beverages available. By oversight, the bartender had displayed only one bottle of each brand of alcohol. Consequently, it was assumed that this may have inhibited the behavior of the participants.

The group that appeared inhibited in their behavior was at the first "party" session and had initially been conceived as a pre-test of the procedures to be used in subsequent sessions. Thereafter, it

was decided that the display of bottles beside the bartender would be standardized to three bottles of each type of alcoholic beverage.

The other group of graduate students passed much of the time (approximately two hours) watching a basketball game on a television set brought by one of the participants. This passive activity of a spectator sport was in direct contrast to the other groups who actively participated in games and conversation. Furthermore, unlike the other groups, these participants were exposed to females while watching the television.

As a result of these observations by the research team, the two groups of graduate students were deleted from the analysis. The omission and pooling of the remaining four organizations resulted in 68 persons for inclusion in the study. On the basis of observations by the research team and a complementary statistical analysis,[34] it was assumed that the groups and situations were sufficiently homogenous to pool the subjects. Moreover, it was assumed that the notion of "group context" would not distort the analysis of individual behavior.[35]

At each session an experienced bartender served soft drinks, bourbon, scotch, vodka, or beer during the sessions. The brand of each

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[34]An analysis of variance on alcohol consumption by group membership added support to the decision to delete the two groups (see Table 8, Appendix B). Moreover, pairwise multiple comparisons of group means by Sheffé's method (cf. Sheffé, 1959; and McNemar, 1969:325) showed that the four fraternities were indicative of a homogenous subset with respect to this variable. It is also noteworthy that the same observations apply to the mean age of each group (see Table 9, Appendix B).

[35]For additional support of this assumption, see Hauser, 1974.

beverage was held constant throughout the research.[36] Any drinking was at the option of the participants. The bartender kept a relatively unobtrusive record of the amount and frequency of each beverage consumed by each individual. The research team drank only soft drinks throughout the sessions.

The snacks served at each party included peanuts, corn chips, ham, salami, cheese (Swiss and American), and party rye bread. No record was kept of each individual's consumption of food.

Sample Description and Limitations

The sampling procedure can best be described as a combination of purposive and accidental sampling. The concern with the hormones, testosterone and cortisol, limited our concern to males, without any presence of females. This was justified on the basis that males' testosterone, and perhaps cortisol, levels react to the presence of females (cf. Rose, Gordon, and Bernstein, 1972). Furthermore, it was necessary to deal with intact groups as the introduction of strangers could have a significant influence on hormone levels (cf. Rose, Gordon, and Bernstein, 1972; and Bogdonoff, et al., 1964).

Initially, the research design called for the inclusion of two fraternities, two groups of graduate students, and two non-University male organizations, e.g., Jaycees. After repeated failure in acquiring the non-University groups, it was decided to obtain two additional

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[36]These included Coca-cola, Seven-up, Jack Daniels Bourbon (96 proof, Chivas Regal Scotch (86 proof), Smirnoff's Vodka (80 proof); Schlitz and Budweiser beer (6 percent alcohol).

fraternities. Of the four fraternities, two had total memberships of 25 persons or less and two had memberships of approximately 50 persons. In the case of the smaller fraternities almost the entire group attended the session. Of the two larger fraternities approximately 30 to 40 percent attended. Based on the researchers' observations of these larger groups it was concluded that a reasonable cross-section had been attracted and that it was not just limited to any one clique. It is conceivable that a pre-selection factor operated in recruiting certain types of persons to each of the fraternities. To the researchers' knowledge, however, this was not the case with these fraternities.

The means, standard deviations, and minimum and maximum values for age, post-drinking blood alcohol, pre-drinking testosterone and cortisol for the pooled sample, as well as for each group included in the study, are found in Appendix B, Tables 10 through 13. These statistics are reported for the two deleted groups in Tables 14 through 17, Appendix B.

II. OPERATIONAL DEFINITIONS OF THE VARIABLES

Self-concept

Two sets of items were selected to guage the extent to which one positively or negatively evaluated their own worth. The 10-item Rosenberg Self-esteem Scale (Rosenberg, 1965) and the 8-item Cutick-Diggory Self-evaluation Scale (Cutick, 1962), as refined by Diggory (1966) were adopted as complementary measures of self-concept.[37]

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[37]For details of reliability and validity on these scales, see Robinson and Shaver, 1973:Chapter 3.

These items were pooled and then factor analyzed using a "principal factor solution" (cf. Harman, 1967) for extraction of the initial matrix. The initial matrix was reduced to simple structure (cf. Thurstone, 1947) by deleting items that did not have at least a .5 loading on any factor. This process was then repeated until Thurstone's criteria for simple structure were satisfied (cf. Schuessler, 1971:128). The remaining seven items were re-factored and obliquely rotated. The result of this procedure yielded two interpretable factors. Self-concept factor 1 was labelled "cognitive self-esteem" as the items which loaded highly on that factor were three of the Rosenberg items. Self-concept factor 2 was labelled "behavioral self-evaluation" as the items which loaded highly on that factor were four of the Cuttick-Diggory Self-evaluation items. These factors were then used to generate standardized factor scores as the basis for a composite index of each of the factors (cf. Harman, 1967:352). The items are located in Appendix C and the results of the factor analysis are shown in Tables 18 through 23 in Appendix C.

Indicative of Factor 1 is the item: "I take a positive attitude toward myself." Indicative of Factor 2 is the item: "When a situation demands that I take initiative and act independently, I can function effectively and efficiently on my own."

"Social Anxiety"

The construct "social anxiety" is operationally defined by 48 items from the Kalin Personality Test (Kalin, 1972). These items were the result of a factor analysis of 100 items culled from the California Personality Inventory, the Omnibus Inventory (Form D), and the

Minnesota Multiphasic Personality Inventory.

Kalin (1972) and Williams, et al. (1971) have used the Kalin inventory with college students in several samples. The items have consistently yielded factors indicative of at least three aspects of "social anxiety" or "social uneasiness."[38] These have been labelled (1) assertive antisocial behavior, (2) lively social presence, and (3) adherence to order.

Using the same procedure as discussed in the previous section, the terminal solution of the items yielded two interpretable factors consisting of 13 items. Factor 1 was labelled "lively social presence" and Factor 2 was labelled "assertive anti-social behavior" and had high loadings on four items. These factors were then used to generate standardized factor scores as the basis for a composite index of each of the factors (cf. Harman, 1967:352). The items are located in Appendix C and the results of the factor analysis are shown in Tables 24 through 29 in Appendix C.

Indicative of Factor 1 is the item: "When in a group of people I have trouble thinking of the right things to talk about." Indicative of Factor 2 is the item: "During one period when I was a youngster I engaged in petty thievery."

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[38]The labelling of these factors as indicants of the construct "social anxiety" is predicated on the author's inference of the overall meaning content of the items.

Biological Variables

The assays of the three biological variables were conducted by separate and independent laboratories. The blood analysis (pre-drinking Time 1 and post-drinking Time 2) was measured in plasma using a modification of the automated gas chromatographic headspace procedure (cf. Machata, 1972, 1971). Blood Alcohol Concentration ("blood alcohol" or BAC) values are reported in percentage concentrations (100 mg./100 ml.).

Testosterone concentration in plasma was determined by a highly specific competitive protein binding technique in which there is a coefficient of variation of 11 percent in multiple analyses of pooled samples (cf. Demetriou and Austin, 1970; Lunde and Hamburg, 1972).[39] Testosterone values are reported in milliliters (ml.).

Cortisol assays were done with a competitive protein binding assay (cf. Nugent and Mays, 1966). Commercially prepared sera (Lederle diagnostics) were analyzed with each run. These included a normal control and an abnormal control.[40] Cortisol values are reported in nanograms (ncg percent).

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[39] A double-blind procedure was used to check the laboratory's analysis of testosterone. The test-retest correlation coefficients are based on matched samples taken from members of the research team. The test-retest correlations are .487 (N=17) for samples taken prior to the "party" sessions and .728 (N=17) for samples taken after the party sessions. It is notable that the pre-party coefficient is based on data that include one extreme outlier. The omission of that matched-pair results in a test-retest correlation of .85 (N=16) for the pre-party samples.

[40] In order to assure comparability, two control sera were analyzed with the assay of each group. The control sera were commercially prepared by Lederle Diagnostics and stored in lyophilized form. Prior to use, the sera were reconstituted with distilled water for a minimum of 30

Examination of pre-drinking BAC's revealed that only one subject had consumed any alcohol prior to the gathering. His pre-drinking BAC was 8 mg./100 ml. and his post-drinking level was 49 mg./100 ml.

To assess the change in cortisol and testosterone the formula

$$T_2 - T_1$$

where T_2 = post-drinking concentrations

and T_1 = pre-drinking concentrations

is used. Thus a positive figure indicates an increase in concentrations while a negative figure stands for a decrease.

"Self-reported Excessive Drinking"

A major difficulty in dealing with alcohol-related research is the conceptual confusion and the lack of definitional consistency in the literature. Furthermore, there is always the problem in research of the measures being epistemically correlated to the concepts. Cattell has noted, however, "that in science it often turns out that a better procedure than that of defining something is to discover something" (1964:396).

In the present study it was noted that the inclusion of a person's behavioral history with respect to alcohol consumption could be an

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minutes, according to the manufacturer's recommendation, and then the sera were analyzed as if they were unknown. The normal control (Ledernorm) had a manufacturer's assay (± 2 S.D.) of 30 ± 7 ncg percent, while the abnormal control (Ledertrol) had a manufacturer's assay (± 2 S.D.) of 30 ± 7 ncg percent. Inspection of each pooled assay indicated that the values of each assay were well within acceptable limits of the manufacturer's assay.

important specification variable, both for the social psychological and the biological variables. Since no objective evidence was available it was decided to use a questionnaire item indicative of past alcohol-related behavior. The item selected was similar in content to several of the items in Park's (1958) "Problem Drinking Scale" (cf. Williams, 1967b). The item was: "I have drunk so much that I couldn't remember afterwards some of the things I had done." The response categories (with frequencies) were:

Never	Once or Twice	Several Times	Often	Very Often
(17)	(24)	(18)	(3)	(3)

The 24 persons who responded "several times, often, or very often" were classified in the category "self-reported excessive drinking." The neologism "E.D." was adopted for this category. The 41 persons who responded "never" or "once or twice" were classified in the category "self-reported non-excessive drinking." The neologism "N.E.D." was adopted for this category. These neologisms were adopted to encourage the reader to recall the operational basis of the classification and to de-emphasize non-operational connotations.

Two other items were considered in addition to the item selected. The three items were intercorrelated in the .40 to .50 range. The two items that were rejected, however, lacked a behavioral referent. Furthermore, the item selected was the one least related (R^2 = .2136) with alcohol consumption, the dependent variable. The last observation encouraged inclusion of the variable in the sense that it minimized the possibility of predicting the dependent variable on the basis of a functionally related independent variable.

III. METHODOLOGICAL CONSIDERATIONS IN THE RESEARCH DESIGN

As was previously discussed, this study was limited to male participants. Even with the omission of females several problems were encountered which could potentially affect the validity of the findings. While the research design was non-experimental, attempts were made to standardize the "party" sessions and to limit such extraneous influences as discussed below.

Kalin, McClelland, and Kahn (1965) and Williams (1966) have criticized the traditional experimental approach used in alcohol research (intraveneous administration, lab or hospital settings, etc.). Such conditions are likely to disguise the psychodynamics of the participants and/or produce undue anxiety. Williams maintains that "comparing alcohol and placebo subjects does not isolate the effects of alcohol *per se*: it isolates the effect of alcohol in an anxiety-arousing atmosphere" (1966:689). The researchers' desire for uninhibited behavior encouraged a design which would allow people to drink on their own volition and in natural party settings. Hence, too, the decision to provide a variety of beverages for ad-lib consumption. While it is known that different alcoholic beverages have different absorption rates (cf. Newman and Abramson, 1942a, b), it was assumed that the three-hour interval would provide sufficient time for the blood analysis to discriminate differences in consumption. This assumption was predicated on Brinkman, *et al.*'s (1972:98) conclusion that "early breath and blood sampling may lead to serious errors." Since no record was kept of food consumption at the party it was assumed that such behavior was random

and would not systematically distort the post-drinking blood alcohol assay.

A potentially extraneous factor could be the diurnal rhythm of testosterone and cortisol. It is known that these hormones vary on a rhythmic and daily basis (cf. Swain, 1969:70, 72, 197; Luce, 1971; and Nichols and Tylor, 1967). The low-point for cortisol and testosterone is approximately 6:00 P.M. and midnight (cf. Rose, et al., 1972a). Testosterone peaks-out at about 6:00 A.M. and cortisol from between 8:00 A.M. and 12:00 A.M. and again around 4:00 P.M. (cf. Rose, et al., 1972a). For consistency it was decided to obtain blood samples around 8:00 P.M. and 11:00 P.M. for both steroids. This was a compromise solution to the time differential between the diurnal variations of the two steroids. It was predicated on such considerations as time of dinner meal and usual time of social gatherings among college males (see Figure 1).

The absence of longitudinal baseline physiological measures for each of the participants restricts the power of the empirical findings of the present study. That is, it is conceivable that each person might have their own diurnal pattern and/or that the observed levels of the biological variables are responses to the anticipation of the "party" situation or of the venipuncture (cf. Oken, 1967; Davis, et al., 1962; and McGrath, 1970). The pooling of the subjects is based, then, on the unverified assumption that such error is averaged out in the pooling process. Furthermore, the lack of a control group for which to compare testosterone changes and cortisol changes further restricts the power of any observations dealing with more than one point in time, i.e., the

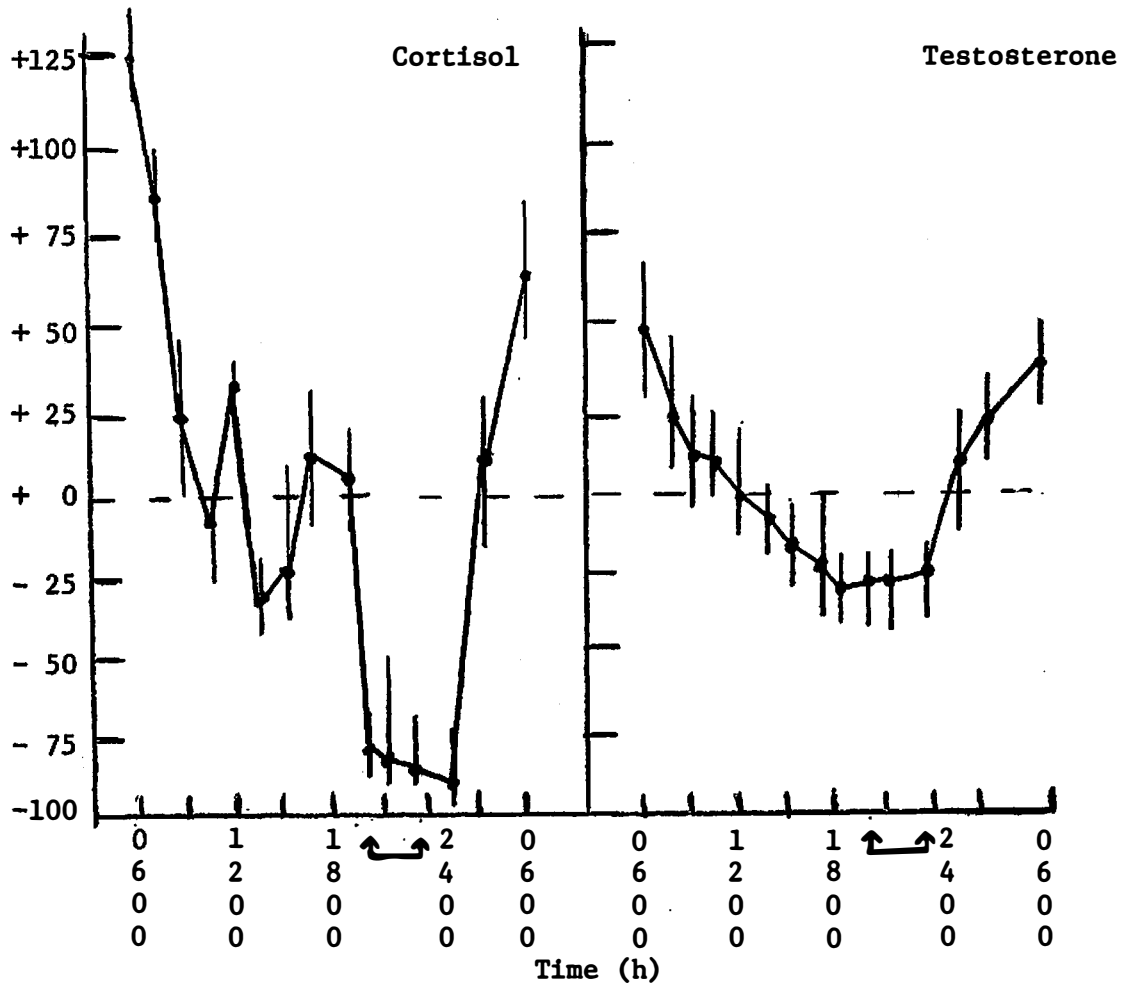

Figure 1. Percent deviation from the mean for plasma testosterone and cortisol concentration analyzed approximately every 90 minutes for five men, aged 19-23 years.[a, b]

[a]The time interval noted by the carats marks the approximate time of the present study.

[b]These graphs were adopted from R. M. Rose, et al., "Dirunal variation of plasma testosterone and cortisol," Journal of Endocrinology, 54:178, 1972. The vertical lines in the graph indicate ± S.E.M.

change variable for cortisol and testosterone. It is noteworthy, however, that the study by Rose, et al. (1972a) would imply that the hours of the party sessions (approximately 7:30 P.M. to 11:30 P.M.) would generally include the period when most persons are at their lowest concentration points for testosterone and cortisol (see Figure 1). It is also notable that intensive analysis indicated that those classified as "self-reported excessive drinkers" had a lower mean pre-drinking cortisol level than those in the "non-excessive" category. This would imply that those classified as "excessive drinkers" might not have been anticipating the situation or the venipuncture as much as one might tend to think. This suspicion, however, remains an unverified assumption.

The protein-binding assay was chosen for its relative accuracy and cost (cf. Lunde and Hamburg, 1972). Though more precise than urine analysis it was recognized that the technique does not completely tap what is known as the 20 percent free-circulating, or unbound, testosterone. It should be noted that some researchers regard this component as possibly the most active component of the hormone (cf. Davidson, 1972: 67).

Finally, an effort was made to measure other extraneous variables which could have conceptual and/or methodological significance. Among these were included age, weight, reported recency of sexual intercourse, reported amount and recency of food consumption, frequency of church attendance, reported average amount of coffee consumed daily, and reported frequency of smoking tobacco the day of the gathering. It is reasonable that any of these could be a variable which could instigate a spurious relationship.

IV. STATISTICAL TECHNIQUES AND LIMITATIONS

The descriptive approach of this research restricts the generalizability of the findings to the persons involved in this study. The primary goal of this study, however, is the prediction of alcohol consumption using the proposed variables. Important, too, is the anticipation that the simultaneous examination of the independent variables will contribute to the production of a quasi-explanatory sketch with basic and applied implications for further research on alcohol-related behaviors. Moreover, the limitations on generalizability are not seen as a flaw in the research design given the analytical nature of the study. This conclusion is based on the idea that representativeness is not essential in the total verification process (cf. Zetterberg, 1965: 128-130). Furthermore, the noting of significance levels is included solely for general informational purposes although the statistical purist may wish to assume a hypothetical and infinite population (with characteristics and attributes identical to those of the persons in the case study) in order to justify their inclusion.

Multiple regression analysis is used to generate a predictive equation for the proposed variables. Pearson's product moment correlations are used for examining the proposed associations between each of the variables. Partial correlation coefficients are included in the tests for spuriousness.

CHAPTER VI

FINDINGS AND ANALYSIS

I. ORGANIZATION OF CHAPTER

This chapter explores answers to the guiding propositions in light of the methodological considerations noted in the previous chapter. As a prelude to the predictive portion of the analysis the zero-order correlation matrix is presented that includes all variables relevant to the propositions. Partial correlation coefficients are used to check for possibly spurious relationships (or non-relationships) observed in the initial correlation matrix. The central focus of the correlational analysis is an intensive examination for each category of the proposed E.D. ("self-reported excessive drinking")--N.E.D. ("self-reported non-excessive drinking") dichotomy. This procedure is an attempt to specify the zero-order relationships on what was proposed as a conceptually relevant variable (cf. Hyman, 1955:295-311).

The next portion of the chapter focuses on the predictive worth of the proposed variables with respect to alcohol consumption. Multiple regression analysis is the multivariate technique used to examine the predictive utility of the variables while taking into account the effects of each of the other variables. The regression solution is also used to examine the directional association and the relative influence of each of the variables when viewed simultaneously.

The remainder of the chapter includes a discussion of the findings with respect to the conceptual scheme. A proposed interpretation of the

findings is offered in the context of a quasi-explanatory sketch. Substantive and research implications are noted and speculations are discussed which have implications for understanding factors that may contribute to the emergence of alcohol-related problems, e.g., chronic alcohol abuse or "alcoholism."

II. CORRELATIONAL ANALYSIS

Pearson's r product-moment correlations are used to explore the proposed relationships prior to analyzing the variables' predictive utility of alcohol consumption. It was proposed in Chapter IV that:

1. Self-concept is negatively related to alcohol consumption; social anxiety is positively related to alcohol consumption; and, pre-cortisol and pre-testosterone are positively related to alcohol consumption. Furthermore, each of these variables has pronounced effects for those classified as "self-reported excessive drinkers."

With reference to intercorrelations among the independent variables, it is expected that:

2. Self-concept is (a) negatively related to social anxiety and pre-drinking cortisol, and (b) positively related to pre-drinking testosterone;
3. Pre-drinking testosterone and cortisol are positively related to social anxiety; and
4. Cortisol and testosterone change are (a) positively related to social anxiety, and (b) negatively related to self-concept.

Corollary: Furthermore, each of these correlations are pronounced for those classified as "self-reported excessive drinkers."

The zero-order correlations for these relationships are presented in Table 1. Six of the proposed relationships appear to receive support. Specifically, social anxiety factor 2, cortisol change, and testosterone change are positively associated with alcohol consumption. Furthermore, pre-drinking cortisol is inversely related to both self-concept factors and testosterone is positively associated with social anxiety factor 2. Four other correlations are of note but are in the opposite direction suggested by the guiding propositions. Social anxiety factor 1 and cortisol change are positively related to both self-concept factors. At this point it would appear that the self-concept, social anxiety, and cortisol may be predictors of alcohol consumption, and that the simultaneous examination of the variables might be useful in controlling for the effects of each of the intercorrelations.

Holding constant on each of the variables selected to test for spuriousness does not result in partial correlation coefficients that are significantly different from the zero-order correlations.[41] Furthermore, as was predicted by the corollary to the propositions, partioning on the E.D.--N.E.D. categories yielded a specification of the initial matrix (Tables 2 and 3). That is, (1) some of the initial

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[41]See Tables 30 through 36, Appendix D, for the results of partialling on the test variables.

TABLE 1

ZERO-ORDER CORRELATION MATRIX OF PROPOSED RELATIONSHIPS[a] (N=65)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0594 (-)	-.0304 (-)	.0555 (+)	.2299* (+)	-.0591 (+)	.2770* (+)	-.0786 (+)	.2492* (+)
Self-concept Factor 1				.2691* (-)	-.0306 (-)	-.3101* (-)	.2514* (-)	-.1309 (+)	.0324 (+)
Self-concept Factor 2				.2155* (-)	-.0300 (-)	-.3919* (-)	.2512* (-)	.0872 (+)	-.0265 (+)
Social anxiety Factor 1						-.2035 (+)	.1724 (+)	.0780 (+)	.1314 (+)
Social anxiety Factor 2						-.0226 (+)	.0037 (+)	.2855* (+)	.0674 (+)
Cortisol[b]							-.7518*	-.0225	-.0383
Testosterone									-.4940*

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

[b]The interrelationships among cortisol, cortisol change, testosterone and testosterone change are reported for informational purposes only as there were no propositions relating to their interrelationships.

TABLE 2

PROPOSED RELATIONSHIPS PARTITIONED BY SELF-REPORTED NON-EXCESSIVE DRINKING (N.E.D.) CATEGORY[a] (N=41)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testoster-one	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0927 (-)	-.0985 (-)	-.1027 (+)	.1291 (+)	.0003 (+)	.0221 (+)	-.2482 (+)	.2403 (+)
Self-concept Factor 1				.1202 (-)	-.1417 (-)	-.3134* (-)	.2969* (-)	-.2287 (+)	.0642 (+)
Self-concept Factor 2				.2784* (-)	-.0215 (-)	-.4862* (-)	.4110* (-)	.0606 (+)	-.0355 (+)
Social anxiety Factor 1						-.1271 (+)	.0332 (+)	.1475 (+)	.1318 (+)
Social anxiety Factor 2						.0009 (+)	.0113 (+)	.2275 (+)	.1636 (+)
Cortisol[b]							-.9115*	-.0349	-.0266
Testos-terone									-.5324*

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

[b]The interrelationships among cortisol, cortisol change, testosterone, and testosterone change are reported for informational purposes only as there were no propositions relating to their interrelationships.

TABLE 3

PROPOSED RELATIONSHIPS PARTITIONED BY SELF-REPORTED EXCESSIVE DRINKING (E.D.) CATEGORY[a] (N=24)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testoster-one	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		-.1445 (-)	.2362 (-)	.1116 (+)	.1280 (+)	.1329 (+)	.4923* (+)	-.0149 (+)	.4745* (+)
Self-concept Factor 1				.4900* (-)	.0950 (-)	-.3105 (-)	.0538 (-)	-.0098 (+)	-.0305 (+)
Self-concept Factor 2				.1761 (-)	.0101 (-)	-.2060 (-)	.0043 (-)	.1614 (+)	-.0199 (+)
Social anxiety Factor 1						-.5967* (+)	.2766 (+)	-.0448 (+)	.1869 (+)
Social anxiety Factor 2						.1704 (+)	-.2150 (+)	.3250 (+)	-.0959 (+)
Cortisol[b]							-.1138	.1696	-.2296
Testos-terone									-.4518*

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

[b]The interrelationships among cortisol, cortisol change, testosterone, and testosterone change are reported for informational purposes only as there were no propositions relating to their interrelationships.

relationships observed in Table 1 were amplified in the E.D. category (Table 3); (2) some initial non-relationships emerged as relationships for those in the E.D. category; and (3) the relationships, in general, varied considerably in magnitude and sometimes in direction between the two categories.[42, 43]

In the zero-order matrix (Table 1) both self-concept factors appeared unrelated to alcohol consumption. In the N.E.D. category (see Table 2) this is also the case. However, in the E.D. category (see Table 3) self-concept factor 2 is positively related to alcohol consumption ($r = .2362$) while self-concept factor 1 is somewhat negatively related ($r = .1445$). This split in directionality was unexpected and the positive correlation for self-concept factor 2 was altogether unpredicted. Moreover, the changes in these relationships from the zero-order correlation matrix are demonstrative of the impact of the specification variable.

Three remaining correlations within the E.D. category are of interest. "Social anxiety" factor 1 is positively correlated with

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[42]The relationships in each of these categories were also tested for spuriousness with the same test variables that were used for the zero-order correlations. Spuriousness was not indicated for any of these relationships.

[43]The zero-order correlation matrix (Table 1) is used only as an occasional reference point to demonstrate the impact of the specification variable, E.D.--N.E.D. The reader is encouraged to intensively examine the original matrix to further verify the impact of the specification variable--both in magnitude and direction. Moreover, in the absence of this proposed variable many of the zero-order relationships would have led to numerous misinterpretations.

self-concept factor 1 (r = .49) and negatively related to cortisol (r = -.5967). "Social anxiety" factor 2 and testosterone are positively correlated (r = .3250). Of these three relationships only the last one, testosterone and "social anxiety" factor 2 were forecast by the guiding propositions.

Among those classified in the N.E.D. category (Table 2) pre-drinking testosterone and testosterone change appear related to alcohol consumption. The correlation coefficient for pre-drinking testosterone is -.2482 and for testosterone change is .2403. It should be noted that the inverse relationship for pre-drinking testosterone is in the opposite direction suggested by the guiding proposition. For those classified in the E.D. category (Table 3) testosterone is not related to alcohol consumption (r = .0149) while testosterone change is related (r = .4745). Furthermore, cortisol change is positively correlated with alcohol consumption (r = .4923) among those in the E.D. categories. These observations imply that although it is suspected that the larger coefficients for change are partly attributable to the amount of alcohol consumed in the session.

Of the remaining intercorrelations in the N.E.D. category only the relationships between cortisol and self-concept appear noteworthy. The correlation between pre-drinking cortisol and self-concept factor 1 is -.3134 and -.4862 with factor 2. The direction of these relationships is the same for those in the E.D. category (r = -.3105 and -.2060, respectively) and are all in the expected direction. Among those classified in the N.E.D. category cortisol change is positively related to self-concept factors 1 and 2 (r = .2969 and .4110, respectively). Among those

classified in the E.D. category there appears to be no relationship between either of the self-concept factors and cortisol change. As was posited a low self-concept would appear to be related with higher cortisol levels.

While the specification variable E.D.--N.E.D. prompted some salient differences between each subgroup, the resulting correlations within each appear contradictory to many of the expectations stated in some of the guiding propositions. Consequently, interpretation of the findings is reserved until the data are subjected to multivariate analysis. While the intercorrelations among the data prohibit an exact accounting of each variable's independent contribution to explaining the variance of alcohol consumption, the technique of multiple regression does allow for (1) an evaluation of the variables' predictive utility while simultaneously taking into account the effects of the other variables, and (2) an examination of the relative influence and direction of each of the variables as related to alcohol consumption.[44] Thus, rather than view the apparent lack of support for many of the propositions as indicative of a weak conceptual frame, the specified intercorrelations invite the following multivariate analysis as an aid to clarification of the data prior to interpretation.

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[44]For an explication of these points, particularly as to the limitations of intercorrelations in non-experimental research, see Kerlinger, 1974:295-97.

III. REGRESSION ANALYSIS

Tables 4 and 5 present the relevant computations for analyzing the simultaneous effects of the independent variables on alcohol consumption. To incorporate directional differences for the E.D.--N.E.D. specification variable it was necessary to include dummy variables indicative of interaction effects as well as the variables for the main effects (cf. Kerlinger, 1974:Chapter 10; and Blalock, 1965). Since the number of variables to incorporate these possible interaction effects more than doubled the total number of variables in the equation it is necessary to test for the utility of adding the additional terms. That is, does the change in the number of terms add to the predictive power of the model? If the new equation did not offer a significant improvement when adding the set of dummy variables and if the total explained variance itself were not significant, then the additional variables would not be worthwhile and the equation and resulting interpretations could not be made with any reasonable degree of confidence.

Table 5 shows an F value of 2.45057 (degrees of freedom = 13,49) for the entire set of variables in the equation. This value is significant at $p \leq .05$.[45] To guage whether or not it was worthwhile to add the

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[45]The F value is approximately .10 short of being significant at $p \leq .01$. For a listing of the observed, predicted and residual values (by subject) that apply to this regression solution see Table 37 in Appendix D.

TABLE 4

MULTIPLE REGRESSION OF BLOOD ALCOHOL ON SELF-CONCEPT FACTORS, SOCIAL ANXIETY FACTORS, PRE-CORTISOL AND PRE-TESTOSTERONE: (N=63)

	b	Beta	Standard Error of b	F
Self-concept factor 1	.41868	.06509	1.069	.153
Self-concept factor 2	-.57681	-.08151	1.189	.236
Social anxiety factor 1	.3400	.05012	1.189	.138
Social anxiety factor 2	1.8343	.26856	.914	4.027
Pre-cortisol	-.08264	-.05784	.201	.169
Pre-testosterone	-.00541	-.14484	.005	1.094
Constant	(15.7931)			

Multiple R = .29270 F = .87454

R^2 = .08567 $p > .10$

Sum of squares regression = 221.51297
Sum of squares residual = 2364.04139

Mean square (regression) = 36.91883
Mean square (residual) = 42.21502

Degrees of freedom:

Regression = 6
Residual = 56

TABLE 5

MULTIPLE REGRESSION OF BLOOD ALCOHOL ON SELF-CONCEPT FACTORS, SOCIAL ANXIETY FACTORS, PRE-CORTISOL, PRE-TESTOSTERONE AND E.D.--N.E.D.[a] (N=63)

	b	Beta	Standard Error of b	F
E.D.--N.E.D.	(5.60591)	.42167	11.67523	.231
Self-concept factor 1	1.25372	.19491	1.25919	.991
(Self-concept factor 1* E.D.-N.E.D.)	-5.63908	-1.75217	2.25797	6.237
Self-concept factor 2	-1.51054	- .21345	1.46535	1.063
(Self-concept factor 2* E.D.-N.E.D.)	5.23593	1.25532	2.20408	5.643
Social anxiety factor 1	- .36041	- .05312	1.12966	.102
(Social anxiety factor 1* E.D.-N.E.D.)	3.31639	.38780	1.88301	3.102
Social anxiety factor 2	1.08749	.15922	1.03138	1.112
(Social anxiety factor 2* E.D.-N.E.D.)	.63618	.07444	1.70453	.139
Pre-cortisol	- .05292	- .03703	.19283	.075
(Pre-cortisol* E.D.-N.E.D.)	1.44279	.48555	1.03010	1.962
Pre-testosterone	- .00602	- .16104	.00623	.933
(Pre-testosterone* E.D.-N.E.D.)	- .00269	- .10357	.00964	.078
Constant	(13.07728)			

Multiple R = .62769
R^2 = .39399
Standard Error = 5.65480

F = 2.4507
p .05

Sum of squares regression = 1018.69455
Sum of squares residual = 1566.85981

Mean square (regression) = 78.36112
Mean square (residual) = 31.97673

Degrees of freedom:
Regression = 13
Residual = 49

[a]E.D.--N.E.D. stands for "self-reported excessive drinking--self-reported non-excessive drinking" where E.D. is coded with a one (1) and N.E.D. is coded with a zero (0). It should be understood that the alpha

TABLE 5 (continued)

intercept for this equation is the "constant" term when E.D.--N.E.D. is in state "0" and is "constant plus (+) the b coefficient of E.D.--N.E.D." when the equation is in state "1"; i.e., "self-reported excessive drinking" category. The "*" stands for a multiplication sign. Consequently, "variable* E.D.--N.E.D." is only operative when the category is in state "1" as the terms dissolve when the category is in state "0"; e.g., (X)*(0)=0.

set of dummy variables one must consider "the extra portion of the regression sum of squares which arises due to the fact that the terms under consideration were in the model" (Draper and Smith, 1966:67). The F value for the extra sum of squares is 2.07. This value is significant at $p < .05$ (degrees of freedom = 13,49).[46] This value would indicate that the addition of the set of dummy variables significantly improves the predictice utility of the model. This observation, coupled with the overall statistical significance of the multiple R, lends support to the worth of the expanded simultaneous regression model.

Table 5 indicates that the variables proposed in the guiding propositions have a multiple R of .62769. Thus the model explains 39.399 percent of the variation in alcohol consumption, the primary dependent variable. Though the exact contribution of each variable to the explanation of that variance is not obtainable from these computations, the relative influence of the independent variables can be ascertained by

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[46]The "extra sum of squares principle" is discussed in Draper and Smith, 1964:67-69. The equation used for calculating the F statistic applicable to his principle is

$$F(r,q) = S_1 - S_2)/r)/S^2$$

where r = the number of variables in the expanded regression equation;

S_2 = sum of squares regression in the model with the least number of variables;

S_1 = sum of squares regression in the model with the most number of variables;

S^2 = mean square error for the model with the most number of variables; and

q = degrees of freedom (residual) with the most number of variables.

In the present case:

$$F(13,49) = ((1018-221)/13)/31.98 = 2.07+$$
$$p < .05$$

comparing the relative Beta's, i.e., the standardized regression coefficients.[47, 48]

Among those classified in the N.E.D. none of the variables appear to be significantly related to alcohol consumption. The largest Beta's (for state "0," the "self-reported non-excessive drinkers") include self-concept factor 2 (Beta = -.21345) and pre-testosterone (Beta = -.16104). Neither of these values has an F-value that approximates the critical value for .05 level of significance. Keeping in mind that the sign of the Beta's are not statistically significant, it is notable that the direction of the relationship for self-concept factor 2 is as was predicted, while the relationship between testosterone and alcohol consumption is in the opposite direction as was proposed.

Four of the six proposed independent variables appear related to alcohol consumption among those classified in the E.D. category. Self-concept factor 1 is negatively related to alcohol consumption; self-concept factor 2 is positively related; "social anxiety" factor 1

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[47] In addition to the relative magnitude of the Beta's, the reported F statistic for each slope (b) is taken into consideration. The guideline for each F value is a critical value of 1.90 which is an approximation of the critical value of 1.90 which is an approximation of the critical value for the .05 level of significance with Degrees of Freedom = (13,49).

[48] When analyzing Table 5 recall that the dichotomy E.D.-N.E.D. and any variables involved with that dichotomy are meaningful only when the term is in state "1," i.e., when they pertain to the code for those classified in the E.D. category. In state "0," i.e., N.E.D., these terms eliminate themselves, e.g., (b_1X_1) (0 = N.E.D.) = 0.

is positively related; and pre-cortisol is positively related. Self-concept factor 2 is the only variable whose direction is opposite to the prediction suggested by the guiding propositions. As in the correlational analysis an interesting observation is the ambivalence of the self-concept factors--one being positively related to alcohol consumption, the other negatively related. This inconsistency is further discussed in the interpretation and discussion sections, and the implications of such an observation are noted in the refined explanatory sketch.

IV. SUMMARY

Before offering an interpretation of the observed relationships a summary of the observations is presented. This summary uses the factor labels assigned in the previous chapter instead of the generic concepts, self-concept and "social anxiety," referred to in the presentation of the data. It is thought that these factor labels are constructs indicative of the substantive content of the factor analysis and that they allow for a more exacting interpretation than would the use of the generic concepts.

In general, the E.D.--N.E.D. dichotomy proved to be useful in specifying the proposed relationships. Multiple regression analysis was useful in simultaneously controlling for the effects of each of the other independent variables.

Among those classified in the N.E.D. category there was some indication that persons with lower "behavioral self-evaluation" scores and with lower levels of pre-drinking testosterone tended to consume more alcohol than persons without these characteristics. However, little explanatory power can be attributed to these variables when they are

viewed simultaneously with the other variables in the equation.

Among self-reported excessive drinkers four variables appear notably related to alcohol consumption.[49] "Behavioral self-evaluation," "lively social presence," and pre-cortisol are positively related to alcohol consumption. "Cognitive self-esteem" is inversely related to alcohol consumption. Only the positive relationship between "behavioral self-evaluation" and alcohol consumption was unexpected. Though the measures of cortisol change and testosterone change were not included in the predictive regression equation, both of their zero-order correlations were significantly related to alcohol consumption for those in the E.D. category.

V. INTERPRETATION

One likely explanation for the unexpected positive relationship between "behavioral self-evaluation" and alcohol consumption was noted in the initial discussion of the conceptual framework. Contrary to the trend in the alcohol literature it was suggested that a "social anxiety" perspective might postulate that an inflated view of "self" could be positively related to alcohol consumption. In view of the findings of the present study this idea can be somewhat explicated.

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[49] A multiple correlation computed separately for the E.D. category was .498+. The relative magnitude of the Beta's for these four variables noted in the text implied that they were the relevant variables.

It was observed that persons relatively high in their "behavioral evaluation of self," relatively low in "cognitive self-esteem," and relatively high on "lively social presence" were more likely to consume larger quantities of alcohol. It is reasoned that a type of dissonance is generated from the inconsistency apparent in the differential relationships of each of the self-concept factors with alcohol consumption. Such dissonance might be the result of what is, in effect, inflated levels of behavioral expectations, internalized from significant others, which exceed the cognitive evaluation of one's own worth. Furthermore, this inconsistency might be one source of the relatively high scores on the "lively social presence" factor which was originally conceptualized as indicative of social uneasiness and/or preoccupation with acceptance in social situations. Similarly, such dissonance could also be manifested with a physiological response in the form of a higher than average cortisol level.

VI. DISCUSSION

The inclusion of a "dissonance" or "inconsistency" dimension within the explanatory sketch should not be interpreted as an attempt to rejuvenate Festinger's (1950) cognitive dissonance theory or Newcomb's balance theory (1950).[50] If one were searching for theoretical and empirical similarities there would most likely be considerable overlap

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[50] While this line of reasoning will not be pursued, it should be noted that Aronson (1968:Chapter 1) has observed that "dissonance theory makes unequivocal predictions only when the self-concept or another strong expectancy is involved."

with the works of Cattell (1966), Epstein (1972), and Williams (1966). The direct similarity is in the meta-theoretical assumption that anxiety is a function of the magnitude and degree of uncertainty that one has about one's own behavior as well as the behavior of others. Furthermore, there is the similar assumption that anxiety has physiological indicants as well as social psychological and psychological indicants, and that social psychological factors may result in physiological altercations.

Empirical support for cortisol changes as a result of social psychological processes is evidenced by the work of Wolff, et al. (1964). At the clinical level these researchers note that:

> Until recently, the main focus of study has been on the relationship between acute changes in adrenal cortical activity and acute changes in emotional state. It now seems likely that, in addition, the chronic "base line" around which these fluctuations occur is profoundly influenced by the defensive organization of the ego (Wolff, et al., 1964:589).

In general, this is to say that cortical response is not solely a function of environmental threat. Moreover, cortical response may result from internal social psychological processes.

Premised on the implications of the empirical findings of the present study, several observations are in order. For one, it should be recalled that a social anxiety factor was significantly related to alcohol consumption only among those classified as self-reported excessive drinkers. It is also noteworthy that the incongruency between self-concept factors appeared to be relevant only for that subgroup. The speculative theoretical notion is that for persons so characterized, excessive alcohol consumption might be a temporary means of alleviating social psychological discomforts and of facilitating social interaction.

However, the return to a state of sobriety may rejuvenate the antecedents and, indeed, may alter the initial levels of each of the variables. Moreover, sobriety may entail feedback that results not in the original levels of the variables but, instead, in a similar configuration with elevated levels for each of the variables. Conceptually, such a feedback process would be more akin to a moving equilibrium than to a single homeostatic state.

Such an "anxiety syndrome" is purely a speculation that requires longitudinal research for validation. Nevertheless, some evidence is available to suggest the reasonableness of the speculation. It was observed that for persons classified in the E.D. subgroup pre-drinking cortisol was positively related to alcohol consumption. For these same people the correlation between alcohol consumption and post-cortisol is .57 (as compared to r = .05 for those classified in the N.E.D. subgroup). Most likely these differences reflect overall differences in the levels of alcohol consumption between the two subgroups. Recalling, however, that adrenal activation is "associated with enhancement of anxiety and dysphoric states" (Ogata, et al., 1971:141), it is quite possible that the unanticipated consequence of extended excessive consumption of alcohol is the inducement of a relative state of physiological stress which could further heighten the propensity to consume alcohol. This general line of reasoning might also help to account for Williams' (1966) observation that reported anxiety and depression (among "heavier" drinkers) increased with increased levels of alcohol consumption.

The efficient cause of such behavior does not have to be restricted to the social psychological variables used in this study. Certain occupations may entail extended alcohol consumption as an implicit part of the job, e.g., account executive, public relations, etc. Moreover, the often called "addiction" to alcohol may be a syndrome that entails physiological conditioning, psychological expectations, and social behaviors.

While the present data do not permit the verification of long-term consequences from these short-term observations, given the line of reasoning developed above there is the direct implication that the consequences of extended excessive consumption of alcohol are not consistent across all persons. The real worth of the observation is, however, not in the immediate refutation or support of the theoretical speculations. Rather, such observations and reasoning invite researchers to proceed in the direction of synthesis of social psychological and biological variables. Such an approach would extend much of the physiological research which, as William Fischer has noted, abuses the notion of human subjectivity. That is: "Meaning and the mental are slipped in through the back door as a necessary afterthought; the body is just a machine" (Fischer, 1970:152). Similarly, it would contribute to the formal recognition by more social psychologists "that humans have bodies as well as norms" (Dotson, 1973).

At the applied level there is also a general implication for, at least, the therapeutic treatment of abusers of alcohol. One of the observations of this study was the multi-dimensionality of self-concept. Thus, the "debased" self-concept often reported among alcoholic persons might be a function of inadequate measurement and conceptualization

and/or a consequence of longitudinal alcohol abuse. If treatment is based on the notion of a unitary self-concept then it is quite possible that unanticipated consequences may emerge. Accepting the notion of, at least, a "cognitive" and a "behavioral" view of self allows for the possibility that altering one dimension might have unanticipated counter-productive consequences. That is, the elevation of one's "cognitive" view of self might also elevate the behavioral expectations.[51] As a consequence the relative dissonance observed among those in the E.D. category might be maintained. If this incongruency were indeed a source of anxiety (social or otherwise) and of elevated cortisol levels, then the unanticipated consequence of the therapy could be the resumption of alcohol abuse.

How it is that some persons choose alcohol over other means to relieve this supposed discomfort is not known. Certainly social acceptance, normative expectations, and a ready and level supply of the commodity are important factors. Nevertheless, additional factors are most likely involved. For example, subcultural differences among ethnic and racial groups could help to account for different types and degrees of excessive behaviors (cf. Ewing, 1974).

Perhaps, too, different socialization experiences are specifying factors. An example of such an approach would be the research that this author and a colleague have recently undertaken. That research is an

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[51]Recall that the correlation between self-concept factor 1 and self-concept factor 2 was .47 (Table 22, Appendix C).

attempt to examine differences in perceived parental expressivity as a specification variable for the relationships observed in the present study. In general it is thought that different socialization experiences influence not only social psychological factors but physiological factors as well.

Such research efforts are surely only the "tip of the iceberg." Nevertheless, it is thought that understanding the complexity of human behavior calls for the cessation of those traditional research modes which sustain a Cartesian dualism of mind and body. The new paradigm calls for the inclusion of efforts to conceptualize, theorize, and research the intertwined nexus of mind and body (cf. Von Bertalanffy, 1964). The present research was conceived as one humble effort in that direction.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The present study was designed with three goals in mind. The primary goal was to generate and research a conceptual scheme that would further the understanding and prediction of alcohol consumption in social settings. Secondly, it was to demonstrate the worth of colligating social psychological and biological variables in one's conceptualizations of social behavior. Thirdly, it was thought that the inclusion of such variables may have basic and applied implications that might otherwise go unexplored had not both sets, biological and social psychological, been included.

The dependent variable of the present study, alcohol consumption, is not generalizable to all social behaviors. Nevertheless, it was thought that the general recognition of social psychological and biological dimensions of alcohol-related behaviors would allow for a demonstration of the utility of moving toward synthesis and would contribute to the understanding of this multi-dimensional behavior.

I. SUMMARY OF CONCEPTUAL FRAMEWORK AND GUIDING PROPOSITIONS

The social psychological literature on alcohol consumption encompasses a broad spectrum. One of the most persistent observations is the reported inverse relationship between self-concept and alcohol consumption (cf. Bateson, 1971; Partington, 1970; and Wahl, 1956). However, most of these findings are studies of alcohol consumption among

alcoholic persons and, in addition, are often conducted in institutionalized settings.

Williams (1964) has observed that in his sample of male collegians, "problem drinkers" were often characterized by independency and self-sufficiency. These same persons, however, scored significantly lower on scales designed to assess self-control. Pursuing his interest in these apparent inconsistencies Williams (1966) studied and observed college drinkers in relatively natural party settings. Here he observed a non-monotonic relationship between psychological anxiety and amount of alcohol consumed. For those who drank less than eight ounces of alcohol anxiety decreased, while for those who consumed more than eight ounces reported anxiety increased. In general, Williams concluded that male-collegian problem drinkers were characterized by a preoccupation with social acceptance but were restricted in their participation within the desired primary group.

Partington (1970) used a multi-dimensional technique for scaling "self-evaluation." His findings suggested a "dualistic self" where "problem drinkers" were more positive toward their "high" self than their "sober" self. McGuire, et al. (1966) reported similar findings. Vanderpool (1968) expanded this idea by maintaining that, among alcoholic persons, drinking did not inflate a low self-concept but further undermined the alcoholic's already poor "sober" self-concept.

Though these studies are only a parcel of the numerous empirical studies dealing with alcohol-related behavior they serve to highlight the relative lack of agreement as to the factors associated with excessive alcohol consumption in general. Indeed, it is noteworthy that

the longitudinal studies of Cahalan and Cisin (1972) imply that "problem drinking" is episodic and that one's alcohol-related behavior varies from situation to situation. From such a perspective it would be reasonable to anticipate synchronic correlations at one point in time which would lack predictive validity through time.

However, there is one commonality among the studies discussed above and that is their relative exclusion of biological variables. While biological research on the consequences of alcohol consumption has been rapidly expanding during the past decade, most of the research has dealt solely with alcoholics and is generally theoretical as to antecedents of alcohol consumption. Among the biological variables examined in the alcohol literature are the steroid hormones cortisol and testosterone. In addition to their relationship to an array of sex-related behaviors, researchers have found relationships between each of these hormones and a multiplicity of behavioral patterns. These correlates range from aggression (cf. Lunde and Hamburg, 1972) to status hierarchies (cf. Rose, Gordon, and Bernstein, 1972). More generally, testosterone is often associated with sex-related behaviors and cortisol is recognized as being positively related to anxiety and stress (cf. Hamburg, 1967; Cattell, 1962; and Wolff, et al., 1964). The breadth of the findings suggests that testosterone and cortisol may be two prime candidates for study in relation to alcohol-related behavior.

Studies of the relationship of testosterone to drinking among non-alcoholic persons have not been found, but a few dealing with alcoholics have been reported. Fabre, et al. (1973) found that in 25 to 45 year old chronic alcoholic male volunteers from a penal institution, average

urinary testosterone glucosonide (a testosterone metabolite) was four times as high as the non-institutionalized control group. Mendelson and Mello (1972) have reported that they found plasma testosterone to be above normal in 20 to 47 year old alcoholic male subjects. It is noteworthy, however, that they found an inverse relationship between testosterone and alcohol consumption for a subset of the subjects who participated in an experimental drinking situation.

With respect to cortisol some consensus exists as to its relationship with alcohol. Stokes (1973) found a mean increase in plasma cortisol levels among alcoholic persons during episodes of chronic drinking. Mendelson, et al. (1971) reported similar findings among four alcoholic males. In general, they concluded that

> ethanol induced an increased secretion of cortisol from the adrenal cortex. . . . [Furthermore], no evidence of adaptation or exhaustion of cortisol response was found during or after alcohol withdrawal (Mendelson, et al., 1971:145).

Complementary to these observations is Ogata's general conclusion "that each activation is associated with enhancement of anxiety and dysphoric states" (Ogata, 1971:141).

While the opportunity for synthesis was not readily apparent, there were sufficient commonalities to warrant an attempt at a conceptual framework encompassing social psychological variables and the selected steroids. However, it should be noted that the goal of such a scheme was to develop guiding propositions and not hypotheses to be tested for purposes of statistical inference. Moreover, the primary goal of this research was the prediction of alcohol consumption and the subsequent generation of a quasi-explanatory sketch founded on the observations.

In the preceding discussion it was observed that self-concept was often reported as being inversely related to alcohol consumption. As a complement to this observation it was proposed that "social anxiety," or a preoccupation with social interaction and/or social acceptance, was a conceptual link which was positively related to alcohol consumption and inversely related to self-concept (cf. Rosenberg, 1962). Since cortisol is often associated with anxiety it was postulated that cortisol is positively related to alcohol consumption as well as the construct "social anxiety" but inversely related to self-concept. Testosterone was thought to be positively related to alcohol consumption, self-concept, and social anxiety. Furthermore, it was proposed that these relationships are more prominent among persons with a reported history of "excessive" drinking. This specification was premised on Williams' (1966) observations of differences among "heavier" and "lighter" drinkers and could be indicative of interaction effects (cf. Blalock, 1965). Moreover, it was maintained that, when viewed simultaneously, the variables (self-concept, "social anxiety," cortisol and testosterone) are predictive of alcohol consumption in party-type social settings.

It is noteworthy that the proposed inverse relationship between self-concept and alcohol consumption was premised on the prevailing trend in the literature. However, it is quite possible that these observations are limited to alcoholic persons and are the result of a longitudinal process of alcohol abuse.

Furthermore, even if persons do use alcohol to temporarily alleviate the proposed self-debasement and feelings of anxiety, extended alcohol consumption may be associated with the activation of

unanticipated dysphoric states characterized by social psychological (cf. Williams, 1966) and physiological indicants (cf. Ogata, 1971). Recalling the proposed positive relationships among "social anxiety," cortisol and testosterone, it is possible that alcohol may inflate any of these indicants with the result being increases in each of the others. Thus, what gives "pleasure" to one dimension may produce stress on another. It was anticipated that the simultaneous examination of the variables would prove to be useful in clarifying such implications.

II. SYNOPSIS OF METHODOLOGY

To effect this study of alcohol consumption six groups of male university students were each invited to attend stag parties hosted by the research team. These groups included four fraternities and two groups of graduate students. The subjects were told that their involvement would require responding to a questionnaire and having 50 ml. (two 25 ml. samples) of blood drawn from each man. The subjects were not informed of the specific interest in alcohol consumption and were told that the interest was in relating certain blood factors with some of their responses to the items on the questionnaires. In return for their participation they would be provided with games, snacks, and beverages (including alcohol) during the three hour lapse of time required between blood samples.

A concerted effort was made to standardize the conditions of each party. A concomitant effort was made to induce a casual atmosphere. Subsequent debriefing sessions among the research team suggested that conditions significantly varied for the two groups of graduate students.

Statistical analyses on some of the relevant variables supported these observations. The final sample consisted of 68 males from four fraternities. Statistical analysis complemented the researchers' conclusion that sufficient commonalities existed across the four groups and situations to justify the aggregation of the subjects.

Factor analysis of the data resulted in two factors indicative of self-concept and two factors indicative of "social anxiety." The self-concept factors were labelled "cognitive self-evaluation" and "behavioral expectations." The "social anxiety" factors were labelled "lively social presence" and "admission of anti-social behavior." These labels were thought to be indicative of the substantive content of the items that had high loadings on the respective factor. The construct "self-reported excessive drinking" (E.D.) versus "infrequently reported excessive drinking" (N.E.D.) was assessed by a questionnaire item indicative of the reported extent of personal drinking history. Pre- and post-drinking cortisol and testosterone and blood alcohol concentrations were assayed by independent laboratories.

Correlational analysis was done for each of the proposed relationships. The correlation matrix was then subjected to the effects of several antecedent variables which were selected for their possible explanatory impact. None of these variables held sufficient impact on the zero-order correlations to suggest spuriousness.

A specification of the correlation matrix by the variable E.D.--N.E.D. was then conducted. The results of this procedure were both statistically and substantively relevant.

Multiple regression analysis was then performed to evaluate the predictive worth of the variables for these people. This procedure was useful in controlling for the intercorrelations among the independent variables and for ascertaining the relative importance of each of the variables with respect to alcohol consumption.

III. SUMMARY OF FINDINGS

In general, the specification variable E.D.--N.E.D. proved to be useful in disclosing relationships which would have been quite different, in magnitude and direction, had the zero-order correlation matrix gone untested. Furthermore, multiple regression analysis was useful in simultaneously controlling for the interrelationships observed in the correlational analysis. Thus, this summary is based on the final observations of the study.

Among persons classified in the N.E.D. category there was some indication that those with lower "behavioral self-evaluation" scores and with lower levels of pre-testosterone tended to consume more alcohol than persons without these attributes. In general, however, little explanatory power is attributable to these variables when they are viewed simultaneously with the other variables in the regression equation.

Among persons classified in the E.D. category ("self-reported excessive drinking") four variables appeared notably related to alcohol consumption. "Behavioral self-evaluation," "lively social presence," and pre-cortisol were positively related to alcohol consumption. "Cognitive self-esteem" was negatively related to alcohol consumption.

The only unexpected observation was the positive association of "behavioral self-evaluation" with alcohol consumption. However, the differential association of the two self-concept factors with alcohol consumption have substantive implications that are discussed in the following section.

The inclusion of all specified variables resulted in a multiple R of .62769. The proposed model thus explained 39.399 percent of the variation in alcohol consumption among the subjects. Though excluded from the predictive portion of the analysis due to the inclusion of a post-drinking measure, the correlations between alcohol consumption and testosterone change and between alcohol consumption and cortisol change were significant among persons classified as "heavier drinkers."

IV. CONCLUSIONS AND IMPLICATIONS

Sociologists and social psychologists traditionally have shunned the inclusion of biological variables in their theories, theory sketches, and, particularly, in their research endeavors. Such omissions have not always been the case. George Herbert Mead (1909), for example, proposed that social psychology was a logical counterpart to physiological psychology and much of his early research reflected that contention.

Nevertheless, the apparent trend toward specialization of knowledge, combined with the impetus placed on the establishment of sociology as a distinct academic discipline, generally has precluded efforts to incorporate biological variables into sociological and social psychological research. When such efforts are made, the claim of "physiological reductionism" is heard and is often accompanied by warnings of the demise of sociology.

Such claims. however, are often reflections of philosophical and/or political positions. In particular, it is suspected that the avoidance of potentially relevant biological variables is largely a function of the recollections of sociologists' courting of Social Darwinism and the subsequent rejection of that doctrine. For certain, the exposure of Nazi racism and the atrocities of their research with human subjects has added to the argument against the social scientist's involvement with biological data.

Despite these arguments biological research on human subjects persists. In general, it is conducted on "volunteers" by psychosurgeons, biologists, and physiological psychologists. However, sociology and social psychology are not alone in their tendency to research human behavior from a one-sided, biased perspective. William Fischer (1970:153) has observed that physiologists and physiological psychologists persist in their behavioristic emphasis on "response":

> Even with those who espouse the theory of general arousal, the body is deprived of its initiative, its subjectivity. . . . Meaning and mental are slipped in through the back door as a necessary afterthought; the body is just a machine.

Among contemporary sociologists there are those, however, who do not maintain the staid tradition of a Cartesian dualism of mind and body, e.g., Back and Bogdonoff (1964); Mazur and Robertson (1972); and Moss (1973), to mention but a few. Implicit to a multi-disciplinary perspective is the assumption that explanations of human behavior should not be forfeited to the natural sciences. That is, sociology and social psychology have their own contributions to make in unraveling the complexities of human behavior.

The present study was designed to further the understanding of alcohol consumption by males in party-type social settings. It was also anticipated that the present research would exemplify the utility of incorporating social psychological and biological variables in social research. Though limited in generalizability by a non-experimental design, it was anticipated that the observations of the present study would allow for refinement of the initial conceptual framework. Finally, it was thought that the incorporation of both types of variables may have basic and applied implications that might otherwise go unexplored in their absence.

Each of these goals was partially attained. Though not all of the proposed relationships received support in the data analysis, approximately 40 percent of the variance in alcohol consumption was explained when the proposed variables were viewed simultaneously.

One of the more interesting and unexpected observations was the relationships between each of the self-concept factors with alcohol consumption among persons classified as "self-reported excessive drinkers" (E.D.'s). "Cognitive self-evaluation" was negatively related to alcohol consumption while "behavioral self-esteem" was positively related to alcohol consumption. The interpretation of this observation was that this discrepancy was indicative of internalized expectations that exceeded the evaluation of one's own worth and that this inconsistency might be one source of the positive relationship between a social anxiety factor and alcohol consumption. Furthermore, this line of reasoning would also account for the positive relationship between pre-drinking cortisol and alcohol consumption.

More generally, the notion of an "anxiety syndrome" was discussed with emphasis placed on unanticipated consequences of alcohol consumption, i.e., increased cortisol levels. It was speculated that while the temporary anesthetic effect of alcohol consumption might be a means of briefly alleviating social psychological discomforts and of facilitating social interactions, the return to a state of sobriety may further aggravate the conditions which the alcohol was supposed to reduce.

The speculative notion of an "anxiety syndrome" with respect to alcohol consumption cannot be substantiated in the absence of longitudinal data. However, the present study did produce findings that would imply the need for additional research. It was observed that for persons with a history of excessive drinking (self-reported) pre-drinking cortisol was positively related to alcohol consumption and that alcohol consumption was positively related to post-drinking cortisol. Recalling that adrenal activation is "associated with enhancement of anxiety and dysphoric states" (Ogata, et al., 1971:141), it is quite possible that the unanticipated consequence of extended excessive consumption of alcohol is the inducement of a relative state of physiological stress which could further heighten the propensity to consume alcohol. This may be particularly pronounced when a person is characterized by incongruencies with respect to self-concept as was observed in this study. This general line of reasoning might also help to account for Williams' (1966) observation that among "heavier" drinkers anxiety was positively associated with increased levels of alcohol consumption.

It should be noted that the efficient cause of such a syndrome does not have to be limited to social psychological distress or

anxiety. Occupations, e.g., corporate executives or public relations positions, may involve normative expectations with respect to extended alcohol consumption. Moreover, the often called "addiction" to alcohol may be a syndrome that entails psychological expectations, social behaviors, and physiological conditioning.

The validation of these speculations could have significant implications for therapeutic treatment. For example, treatment premised on the notion that a debased self-concept is the primary cause of alcohol abuse could have counterproductive consequences. If the elevation of one's self-concept was accompanied by a relative increase in behavioral expectations (and, perhaps, by increased adrenal activity), the unanticipated consequence could be to reactivate the proposed syndrome.

With respect to future research it is suggested that consideration be given to the inclusion of an inventory to assess self-other incongruencies, e.g., the Miskimins Self-Goal-Other Discrepancy Scale, as well as measures of the variables proposed in this study. It is also recommended that Park's (1958) factorial alcohol inventory be included for the assessment of personal drinking history as well as general attitudes toward alcohol. It is also recommended that extended base-line measures be taken to establish individual diurnal patterns, if any, of cortisol and testosterone.

In conclusion, it is thought that the major implication of the present research is the need for additional research incorporating social psychological and biological variables, particularly with respect to alcohol related behaviors. While it is recognized that many of the speculations generated from the findings of this study

may be viewed by some as excessive, the author contends that the innovative nature of the research warranted such attempts. Moreover, it was thought that the use of guiding propositions was superior to purely ex post facto analysis and that advances in this general area will not be forthcoming without the continued efforts on the part of behavioral scientists to conceptualize research, and interpret the complementary nature of social psychological and biological efforts in their attempts to understand human behavior.

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APPENDIXES

APPENDIX A

TABULAR COMPARISON OF MAJOR STUDIES RELATING ALCOHOL WITH CORTISOL AND TESTOSTERONE

TABLE 6

COMPARISON OF STUDIES RELATING TESTOSTERONE AND ALCOHOL

Study	N	Age Range	Sex of Subjects	Classified as Alcoholic	Type of Assay	Time of Sampling	Presence of Alcohol	Mean Levels Relative to Normative or Control Levels
Fabre et al. (1973)	10	25-45	Male	Yes	Urinary metabolite	Daily averages	No	+
	10	25-45	Male	Yes	Urinary metabolite	Daily averages	Yes	+
Mendelson and Mello (1973)	8	20-47	Male	Yes	Plasma	0930	No	+
	(subset of 4)	20-47	Male	Yes	Plasma	0930	Yes	-

TABLE 7

COMPARISON OF STUDIES RELATING CORTISOL AND ALCOHOL

Study	N	Age Range	Sex of Subjects	Classified as Alcoholic	Type of Assay	Time of Sampling	Presence of Alcohol	Mean Levels Relative to Normal or Control Levels
Mendelson et al. (1971)	4	35-45	Male	Yes	Serum	Daily (pre- and post-drinking sessions: 0900, 1600, 2300)	Yes (controlled administration)	+
Stokes (1973)	18	38-66	Male	Yes	Serum	Daily (same as above)	Yes (same as above)	+
Verdy and Brouillet (1970)	5	29-61	Males (3) Females (2)	No	Urinary metabolite	Daily average	Yes (same as above)	-

APPENDIX B

METHODOLOGICAL INFORMATION

STUDY OF HUMAN EMOTIONS - INFORMED CONSENT FORM

DEPARTMENT OF SOCIOLOGY
UNIVERSITY OF TENNESSEE
KNOXVILLE, TENNESSEE

This is to ask you to participate in a study of human emotions. Hopefully, the study will contribute to improvements in physical and emotional health. After a testing period of approximately forty-five minutes, a party will be given to thank you and your friends for participating in the study. The party is also a part of the study in as much as some observations will be made. However, these observations will in no way interfere with your enjoying an evening with your friends.

As a participant in this study, you will be asked to fill out a questionnaire and to give two 25 ml. samples of blood (about the amount taken for usual blood tests). We are concerned with the relationship between certain blood characteristics and the answers on the questionnaire. Your anonymity will be assured by the use of code numbers to identify all measures.

The entire evening session will require no more than four hours of your time. Transportation to and from the session will be provided. The research director will be glad to answer inquiries regarding the procedures. These should be made prior to or after the evening you participate.

You are free to withdraw your consent and to discontinue participation in the study at any time. We believe that you and your friends will find it to be an enjoyable evening.

I consent to be a participant in this study of human emotions:

SIGNATURE _____

AGE _____

DATE _____

MAILING ADDRESS _____

PHONE NUMBER _____

TABLE 8

ANALYSIS OF VARIANCE OF POST BLOOD ALCOHOL BY GROUP MEMBERSHIP[a] AND SCHEFFÉ'S MULTIPLE RANGE TEST (N=91)

Source	D.F.	Sum of Sq.	Mean Sq.	F-Ratio	F-Prob.
Between groups	5	.1071	.0214	6.696	0.0
Within groups	82	.2622	.0032		
Total	87	.3693			

Scheffé procedure (Multiple Range Test):

Ranges for the .010 level--
5.71 5.71 5.71 5.71 5.71

Homogenous subsets (subsets of groups no pair of which have means that differ by the shortest significant range for a subset of that size):

Group	A	B	C	D
Mean	.1012	.0972	.0694	.1467

[a]For means, standard deviations, minimum and maximum values by group see Table 11, page 121.

TABLE 9

ANALYSIS OF VARIANCE OF AGE BY GROUP MEMBERSHIP[a] AND SCHEFFÉ'S MULTIPLE RANGE TEST (N=91)

Source	D.F.	Sum of Sq.	Mean Sq.	F-Ratio	F-Prob.
Between groups	5	567.96	113.59	32.10	0.00
Within groups	85	300.73	3.53		
Total	90	868.69			

Scheffé procedure (Multiple Range Test):

Ranges for the .010 level--

6.88	6.88	6.88	6.88	6.88

Homogenous subsets (subsets of groups, no pair of which have means that differ by the shortest significant range for a subset of that size):

Group	A	B	C	D
Mean	20.23	20.22	19.64	20.15

[a]For means, standard deviations, minimum and maximum values by group see Table 10, page 121.

TABLE 10

AGE STATISTICS BY GROUP AND FOR POOLED SAMPLE (N=68)

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
A	13	20.23	2.35	18	25
B	22	20.00	1.34	18	23
C	14	19.64	1.08	18	21
D	19	20.16	1.77	18	24
Total	68	20.08	1.64	18	25

TABLE 11

POST-DRINKING BLOOD ALCOHOL STATISTICS BY GROUP AND FOR POOLED SAMPLE (N=68)

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
A	13	.101	.054	.006	.196
B	22	.097	.053	.025	.221
C	14	.069	.059	.000	.172
D	19	.147	.068	.021	.253
Total	68	.106	.065	.000	.253

TABLE 12

PRE-DRINKING CORTISOL STATISTICS BY GROUP AND FOR POOLED SAMPLE (N=68)

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
A	13	4.85	1.68	1.7	7.2
B	22	5.29	7.03	1.5	35.0
C	14	5.26	4.12	2.0	18.2
D	19	4.83	2.36	2.4	11.0
Total	68	5.06	4.51	1.5	35.0

TABLE 13

PRE-DRINKING TESTOSTERONE STATISTICS BY GROUP AND FOR POOLED SAMPLE (N=68)

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
A	13	349.79	65.61	220.0	428.0
B	22	428.90	145.59	150.0	677.0
C	14	424.93	239.66	137.0	947.0
D	19	504.68	176.60	276.0	922.0
Total	68	434.20	172.88	137.0	947.0

TABLE 14

AGE STATISTICS FOR GROUPS DELETED FROM STUDY

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
E	11	26.40	2.98	22	32
F	12	25.25	1.82	22	27

TABLE 15

POST-DRINKING BLOOD ALCOHOL STATISTICS FOR GROUPS DELETED FROM STUDY

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
E	11	.047	.047	0.0	.134
F	12	.052	.048	.005	.170

TABLE 16

PRE-DRINKING CORTISOL STATISTICS FOR GROUPS DELETED FROM STUDY

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
E	11	2.218	.618	1.2	3.5
F	12	5.892	2.918	2.6	13.5

TABLE 17

PRE-DRINKING TESTOSTERONE STATISTICS FOR GROUPS DELETED FROM STUDY

Group	N	Mean	Standard Deviation	Minimum Value	Maximum Value
E	11	244.6	96.46	72.0	369.0
F	12	448.8	135.08	273.0	648.0

APPENDIX C

ITEMS USED IN CONSTRUCTING SELF-CONCEPT AND SOCIAL ANXIETY SCALES

AND TABLES FOR CORRELATION AND FACTOR LOADING MATRICES

QUESTIONNAIRE ITEMS USED IN CONSTRUCTING SELF-CONCEPT SCALES
(Cutick and Diggory Self-evaluation Items)

RESPONSE CATEGORIES

(1) completely true

(2) mostly true

(3) partly true - partly false

(4) mostly false

(5) completely false

ITEM

1 When I participate in group activities that call for decisions to be made, my ideas and opinions influence the group decisions.

2 When doing things that interest me most, I am fully satisfied with my performance.

3* When a situation demands that I take initiative and act independently, I can function effectively and efficiently on my own.

4 When meeting new people for the first time in social business or academic settings, I am able to impress them favorably and form good relations.

5 When others trust and depend on me to carry out a certain job for them, I do so dependably.

6* When sound judgment is needed about the appropriate actions to be taken in special situations, I can make sound judgments.

7* When I face new situations which require rapid and accurate problem-solving, my solutions are rapid and accurate.

8. When I try to reach important goals of any kind and to succeed generally in my everyday activities, I attain my goals and function consistently with satisfactory results.

NOTE: The asterisk (*) indicates that the item was included in the terminal solution of the factor analysis and in the subsequent composite index.

(Rosenberg Self-esteem Scale)

RESPONSE CATEGORIES:

(1) strongly agree

(2) agree

(4) disagree

(5) strongly disagree

ITEM	
9	On the whole, I am satisfied with myself.
10	At times, I think I am no good at all. (-)
11	I feel that I have a number of good qualities.
12*	I am able to do things as well as most other people.
13*	I feel I do not have much to be proud of. (-)
14	I certainly feel useless at times. (-)
15	I feel that I'm a person of worth, at least on an equal plane with others.
16	I wish I could have more respect for myself. (-)
17*	All in all, I am inclined to feel that I am a failure. (-)
18*	I take a positive attitude toward myself.

NOTE: The asterisk (*) indicates that the item was included in the terminal solution of the factor analysis and in the subsequent composite index. The negative sign (-) beside an item indicates that the item's scoring was reversed so that a "strongly agree" or "agree" response was associated with a high score for that item.

TABLE 18

PEARSON'S r CORRELATION MATRIX OF SELF-CONCEPT ITEMS (N=65)

Item	1	2	3	4	5	6
1						
2	0.41249					
3	-0.33510	-0.31391				
4	0.52466	0.21384	-0.25713			
5	0.26106	0.08715	-0.58070	0.18976		
6	-0.55393	-0.34772	0.63234	-0.30592	-0.46810	
7	-0.45952	-0.29602	0.53893	-0.35642	-0.46691	0.57642
8	0.30362	0.36653	-0.50657	0.34397	0.25659	-0.35136
9	0.46308	0.28962	-0.35001	0.37765	0.19894	-0.42630
10	-0.34034	-0.25144	0.32868	-0.24222	-0.19324	0.35608
11	0.29264	0.31481	-0.46455	0.19127	0.43109	-0.52732
12	-0.15236	-0.16165	0.37073	-0.15868	-0.27383	0.41970
13	-0.22099	-0.36295	0.43092	-0.21236	-0.27724	0.37694
14	-0.30802	-0.29939	0.39417	-0.15320	-0.03778	0.25505
15	0.32785	0.40470	-0.45716	0.30607	0.42064	-0.39096
16	-0.29624	-0.32884	0.36843	-0.31259	-0.12212	0.35328
17	-0.27562	-0.41068	0.43003	-0.13203	-0.28175	0.37911
18	-0.24088	-0.24087	0.48914	-0.14716	-0.30264	0.43776

Item	7	8	9	10	11	12
1						
2						
3						
4						
5						
6						
7						
8	-0.38886					
9	-0.30092	0.40443				
10	0.09954	-0.18016	-0.55161			
11	-0.32471	0.14452	0.34722	-0.35842		
12	0.20546	-0.07742	-0.37366	0.39868	-0.77221	
13	0.24306	-0.42381	-0.53947	0.43612	-0.58631	0.55249
14	0.16544	-0.30726	-0.59264	0.52456	-0.30504	0.40231
15	-0.36335	0.28848	0.34744	-0.32254	0.49808	-0.29440
16	0.16543	-0.33515	-0.50973	0.39714	-0.28545	0.32165
17	0.10893	-0.23976	-0.35182	0.39626	-0.55544	0.43421
18	0.19078	-0.36256	-0.49013	0.43373	-0.39877	0.50576

TABLE 18 (continued)

Item	13	14	15	16	17	18
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14	0.53247					
15	-0.46024	-0.37146				
16	0.51354	0.57510	-0.46854			
17	0.66467	0.31240	-0.53187	0.33999		
18	0.52465	0.43540	-0.42034	0.55880	0.45138	

TABLE 19

INITIAL FACTOR MATRIX OF SELF-CONCEPT ITEMS (N=65)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Communality
1	0.57707	-0.41850	0.28440	-0.42450	0.76923
2	0.48856	-0.07398	0.13806	-0.02181	0.26370
3	-0.72441	0.25667	0.17208	-0.32402	0.72525
4	0.42242	-0.28962	0.23132	-0.18782	0.35111
5	0.48949	-0.32158	-0.37377	0.14925	0.50499
6	-0.70517	0.30529	0.14025	0.07808	0.61623
7	-0.51869	0.54906	0.09283	-0.02026	0.57954
8	0.51648	-0.23529	0.23712	0.31647	0.47849
9	0.68308	0.10422	0.33613	-0.09679	0.59982
10	-0.57587	-0.23220	-0.16421	0.13244	0.43005
11	0.71410	0.17359	-0.52837	-0.26996	0.89211
12	-0.61462	-0.34575	0.35162	0.19272	0.65808
13	-0.74080	-0.31818	0.02192	-0.11490	0.66370
14	-0.60641	-0.31246	-0.33234	-0.03269	0.57688
15	0.64279	-0.02581	-0.04805	0.07605	0.42193
16	-0.62293	-0.20583	-0.31216	-0.10952	0.53985
17	-0.62999	-0.22850	0.14511	-0.03056	0.47109
18	-0.66238	-0.21558	-0.02222	-0.18207	0.51886
Eigenvalue	6.78	1.44	1.18	.653	
Percent of variance	6.75	14.3	11.8	6.5	
Cumulative percentage	6.75	81.8	93.5	100.0	

TABLE 20

UNROTATED FACTOR MATRIX OF REDUCED SELF-CONCEPT ITEMS (WITH ITERATIONS) (N=65)

Items	Factors		Communalities
	1	2	
3	-0.74575	0.26744	.627
6	-0.73675	0.35265	.667
7	-0.51162	0.55520	.570
17	-0.65726	-0.35482	.558
12	-0.62781	-0.20160	.435
13	-0.74452	-0.36492	.687
18	-0.65983	-0.16951	.464
Eigenvalue	3.18	.84	
Percent of variance	79.2	20.8	
Cumulative percentage	79.2	100.0	

TABLE 21

OBLIQUELY ROTATED FACTOR PATTERN MATRIX OF REDUCED SELF-CONCEPT ITEMS (N=65)

Items	Factors	
	1[a]	2
3	.283	.617
6	.200	.702
7	.139	.811
17	.779	-.072
12	.621	-.074
13	.849	-.043
18	.614	.122

[a]The vector of Factor 1 was reflected (by -1).

TABLE 22

CORRELATION MATRIX OF SELF-CONCEPT FACTORS (N=65)

Factors	1	2
1	1.0	.477
2		1.0

TABLE 23

FACTOR SCORE COEFFICIENTS, MEANS, AND STANDARD DEVIATIONS FOR SELF-CONCEPT ITEMS (N=65)

Item	Factor Score Coefficient		Item Mean	Item Stan. Devia.
	Factor 1[a]	Factor 2		
3	.124	.313	1.91	.605
6	.113	.396	2.00	.612
7	-.076	.343	2.48	.664
17	.231	-.043	1.66	.538
12	.159	.023	1.82	.429
13	.419	.008	1.86	.609
18	.173	.036	1.95	.540

[a]This vector of factor score coefficients was reflected (by -1) to that high scores on individual items would reflect high scores on the composite index.

QUESTIONNAIRE ITEMS USED IN CONSTRUCTING SOCIAL ANXIETY SCALES

(Kalin Personality Inventory)

RESPONSE CATEGORIES

(1) completely true

(2) mostly true

(3) partly true - partly false

(4) mostly false

(5) completely false

ITEM

1* As a youngster in school I used to give the teachers a lot of trouble.

2* During one period when I was a youngster I engaged in petty thievery.

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

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

5 I have used alcohol excessively.

6 I have often either broken rules (school, club, etc.,) or inwardly rebelled against them.

7 There have been a few times when I have been very mean to another person.

8 Let us eat, drink, and be merry, for tomorrow we die.

9* In school my marks in deportment were quite regularly bad.

10 I like to be with a crowd who play jokes on one another.

11 I played hooky from school quite often as a youngster.

12 I crave excitement.

13. I have always hated regulations.

14. I like to play pranks upon others.

15 I have never done any heavy drinking. (-)

16 I have never indulged in any unusual sex practices. (-)

17 I have used alcohol moderately (or not at all). (-)

18* I am a good mixer.

19* I would rate myself as a lively individual.

20* Other people regard me as a lively individual.

21* I seem to make friends about as quickly as others do.

22 I would rate myself as a happy-go-lucky individual.

23* I can usually let myself go and have a hilariously good time at a gay party.

24 I like large, noisy parties.

25* I like parties and socials.

26 I was fond of excitement when I was young (or in childhood).

27* I like to go to parties and other affairs where there is lots of loud fun.

28 I really enjoy plenty of excitement.

29 Little things upset me. (-)

30 I must admit I feel sort of scared when I move to a strange place. (-)

31 I often get disgusted with myself. (-)

32 It is hard for me to start a conversation with strangers. (-)

33* I am inclined to keep in the background on social occasions. (-)

34* When in a group of people I have trouble thinking of the right things to talk about. (-)

35 I am known as a hard and steady worker.

36 I have been inspired to a way of life based on duty which I have carefully followed.

37 I set a high standard for myself and I feel others should do the same.

38 I do not like to see people carelessly dressed. (-)

39 I like to have a place for everything and everything in its place. (-)

40 I think I am stricter about right and wrong than most people. (-)

41 I always like to keep my things neat and tidy and in good order. (-)

42 I always follow the rule: business before pleasure. (-)

43 I like to plan a home study schedule and then follow it. (-)

44 The surest way to a peaceful world is to improve people's morals. (-)

45 The trouble with many people is that they don't take things seriously enough. (-)

46 I enjoy planning things, and deciding what each person should do. (-)

47 I would rather be a steady and dependable worker than a brilliant but unstable one. (1)

48 I always try to do at least a little better than what is expected of me. (-)

NOTE: The asterisk (*) indicates that the item was included in the terminal solution of the factor analysis and in the subsequent composite index. The negative sign (-) beside an item indicates that the scoring for response categories was reversed so that a "mostly true" or "completely true" response was associated with a high score for that item.

TABLE 24

PEARSON'S r CORRELATION MATRIX OF SOCIAL ANXIETY FACTORS

Item	1	2	3	9	18
1					
2	0.34248				
3	0.71881	0.50423			
9	0.59424	0.36905	0.64187		
18	0.01391	0.00679	-0.02574	0.14344	
19	0.03058	-0.07801	-0.10756	-0.04449	0.62805
20	-0.06070	0.08694	-0.13943	-0.09814	0.58106
21	0.06066	0.09850	0.01264	0.15286	0.59156
25	-0.00178	-0.01893	-0.15850	0.07885	0.41733
27	0.01067	-0.02864	-0.04487	-0.04324	0.27642
33	0.21883	0.12822	0.05903	0.18956	0.59375
34	-0.11756	-0.09509	-0.16273	-0.08180	0.42703
23	-0.10190	-0.01359	-0.18479	-0.12795	0.43430

	19	20	21	25
1				
2				
3				
9				
18				
19				
20	0.81707			
21	0.42509	0.46476		
25	0.36485	0.38103	0.28331	
27	0.29415	0.30572	0.11146	0.53324
33	9.67054	0.67442	0.52569	0.44339
34	0.57889	0.58125	0.49977	0.36508
23	0.47791	0.52006	0.38257	0.65863

	27	33	34	23
1				
2				
3				
9				
18				
19				
20				
21				
25				
27				
33	0.37623			
34	0.26925	0.60137		
23	0.64586	0.56130	0.48367	

TABLE 25

INITIAL FACTOR MATRIX OF SOCIAL ANXIETY ITEMS (N=65)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1	0.15826	-0.50023	0.23090	-0.16825	0.34670	-0.30342
2	0.25852	-0.56429	0.20231	-0.44973	0.11697	0.12163
3	0.34852	-0.53830	0.21106	-0.30800	0.25576	-0.18048
4	0.36431	-0.56952	0.21245	-0.27585	0.17041	0.28453
5	-0.44903	0.42324	-0.14897	0.12450	0.43223	-0.22631
6	-0.25923	0.59104	0.09846	0.18096	-0.09568	-0.04348
7	-0.41481	0.37772	0.04997	0.04869	-0.20153	-0.25833
8	-0.13584	0.28556	0.36935	0.09487	0.52876	0.09282
9	0.17837	-0.46042	0.26670	-0.11442	0.17713	-0.26227
10	-0.30205	0.37763	0.15688	-0.41404	-0.06854	-0.03456
11	-0.19010	0.33602	-0.04483	0.25689	-0.07505	0.00981
12	-0.57839	0.26568	0.35710	-0.16002	-0.03890	-0.17954
13	-0.19987	0.26642	-0.07038	-0.08038	-0.09994	-0.05592
14	-0.47989	0.23307	0.09521	-0.33264	-0.41411	-0.08654
15	0.41490	-0.31237	0.25193	-0.22011	-0.52686	0.21763
16	0.22996	-0.13215	0.12239	-0.39886	-0.22548	0.04442
17	0.19750	-0.13710	0.10247	-0.23908	-0.44508	0.11901
18	-0.56345	-0.45422	0.06544	0.19657	-0.13445	0.07150
19	-0.63609	-0.35800	-0.09946	0.23192	-0.04643	0.13845
20	-0.66108	-0.33577	-0.07564	0.02910	-0.15958	0.13391
21	-0.41451	-0.46522	-0.12919	0.11962	-0.21661	0.00761
22	-0.43374	-0.26102	0.15780	-0.00738	0.19284	0.00748
23	-0.77527	-0.11801	0.20303	-0.08554	0.07854	0.31194
24	-0.57007	0.16236	0.40020	-0.29535	0.17476	0.22924
25	-0.67238	-0.11652	0.26016	-0.04433	0.10405	0.01585
26	-0.63625	0.02281	-0.09622	-0.09257	0.04764	0.07343
27	-0.65913	0.07504	0.30043	-0.32954	0.16946	0.15978
28	-0.71435	0.09396	0.12977	-0.12711	0.03203	0.12002
29	-0.01481	0.36399	0.43769	0.18641	-0.31469	0.05474
30	0.27942	0.19762	0.32919	0.22363	-0.03129	-0.05142
31	0.00649	0.43664	0.30580	-0.09122	-0.12729	-0.13898
32	0.37491	0.44470	0.40541	-0.01088	0.22218	0.11171
33	-0.68114	-0.54322	-0.04795	0.03762	0.06242	-0.03098
34	-0.57000	-0.29176	-0.24496	0.12014	-0.17874	0.14091
35	-0.32184	-0.32091	-0.09122	0.05579	0.14090	-0.33608
36	-0.04839	-0.29098	0.16200	0.25417	-0.04546	-0.44499
37	0.01651	-0.28193	0.04268	0.18256	-0.30543	-0.24514
38	0.01703	-0.02329	0.43593	-0.00399	-0.16350	-0.28246
39	0.02144	-0.02753	0.52200	0.56462	-0.07589	0.30224

TABLE 25 (continued)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
40	0.14895	-0.27813	0.07262	0.02826	-0.26266	0.06734
41	0.16808	-0.27040	0.53628	0.34778	-0.07674	0.21150
42	0.14740	-0.30849	0.16537	0.41904	0.23220	0.05791
43	0.16969	-0.20353	0.41193	0.49398	-0.01223	0.10833
44	0.10463	0.09124	0.30995	-0.19243	-0.15035	-0.24943
45	-0.06552	0.09358	0.38222	0.02592	-0.00242	-0.41916
46	-0.37778	-0.33446	0.15198	0.01211	-0.11729	-0.31081
47	-0.24060	-0.06029	0.20380	-0.01071	-0.17911	-0.12682
48	-0.31001	-0.39389	-0.14831	0.14462	-0.04225	-0.24071
Eigenvalue	7.61	5.31	3.07	2.59	2.25	1.84
Percent of variance	33.6	23.5	13.5	11.4	9.9	8.1
Cumulative percentage	33.6	57.0	70.6	82.0	91.0	100.0

TABLE 26

UNROTATED FACTOR MATRIX OF REDUCED SOCIAL ANXIETY ITEMS
(WITH ITERATIONS) (N=65)

Items	Factors		Communalities
	1	2	
1	.014	-.779	.607
2	.001	-.504	.254
3	.147	-.893	.819
9	-.002	-.749	.562
18	-.713	-.105	.520
19	-.795	.009	.631
20	-.809	.033	.655
21	-.591	-.146	.371
25	-.596	.025	.356
27	-.483	.034	.234
33	-.828	-.244	.745
34	-.694	.098	.492
23	-.734	.121	.554
Eigenvalue	4.46	2.34	
Percent of variance	65.6	34.4	
Cumulative percentage	65.6	100.0	

TABLE 27

OBLIQUELY ROTATED FACTOR PATTERN MATRIX OF REDUCED SOCIAL ANXIETY ITEMS (N=65)

Items	Factors[a] 1	2
1	.016	.779
2	.019	.504
3	-.112	.896
9	.030	.749
18	.717	.090
19	.794	.025
20	.807	.049
21	.597	.134
25	.595	-.037
27	.481	-.044
33	.837	.227
34	.690	-.113
23	.729	-.136

[a]The vectors of Factor 1 and Factor 2 were reflected (by -1).

TABLE 28

CORRELATION MATRIX OF SOCIAL ANXIETY FACTORS (N=65)

Factors	1	2
1	1.0	-.018
2		1.0

TABLE 29

FACTOR SCORE COEFFICIENTS, MEANS, AND STANDARD DEVIATIONS FOR SOCIAL ANXIETY ITEMS (N=65)

Item	Factor Score Coeff.[a]		Item Mean	Item Stan. Devia.
	Factor 1	Factor 2		
1	-.009	.169	3.55	1.061
2	-.009	.027	3.66	1.384
3	-.033	.613	3.57	1.199
9	.020	.186	3.86	.916
18	.137	.012	2.39	.896
19	.149	-.061	2.35	.837
20	.187	.027	2.43	.847
21	.066	.044	2.40	.825
25	.082	.047	1.83	.762
27	.036	-.045	2.46	.849
33	.271	.167	3.63	.851
34	.103	.167	3.63	.773
23	.195	-.063	2.41	.935

[a]The vectors of Factor 1 and Factor 2 were reflected (by -1) so that higher scores on individual items would reflect higher scores on the composite index.

APPENDIX D

PARTIAL CORRELATION COEFFICIENTS FOR TESTING FOR SPURIOUSNESS AND PREDICTED, OBSERVED, AND RESIDUAL VALUES FOR REGRESSION SOLUTION

TABLE 30

PROPOSED RELATIONSHIPS CONTROLLING FOR AGE[a] (N=52)[b]

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testoster-one	Testoster-one Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0682 (-)	-.0374 (-)	.0761 (+)	.2175 (+)	-.0243 (+)	.2502* (+)	-.0305 (+)	.2165 (+)
Self-concept Factor 1				.2656* (-)	-.0259 (-)	-.3289* (-)	.2691* (-)	-.1530 (+)	.0468 (+)
Self-concept Factor 2				.2217 (-)	-.0341 (-)	-.3932* (-)	.2489* (-)	.1042 (+)	-.0381 (+)
Social anxiety Factor 1						-.2361* (+)	.2046 (+)	.0450 (+)	.1691 (+)

TABLE 30 (continued)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Social anxiety Factor 2						-.0007 (+)	-.0191 (+)	.3336* (+)	.0427 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

[b]The reduction in the N from 65 in the zero-correlations to 52 in the partial correlations is a result of missing data. A visual examination of all cases did not reveal any systematic omission of information.

TABLE 31

PROPOSED RELATIONSHIPS CONTROLLING FOR BODY WEIGHT[a] (IN POUNDS) (N=52)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0517 (-)	-.0370 (-)	.0472 (+)	.2317* (+)	-.0568 (+)	.2646* (+)	-.0606 (+)	.2486* (+)
Self-concept Factor 1				.2627* (-)	-.0299 (-)	-.3090* (-)	.2384* (-)	-.1146 (+)	.0309 (+)
Self-concept Factor 2				.2103 (-)	-.0294 (-)	-.3911* (-)	.2425* (-)	.1051 (+)	-.0278 (+)
Social anxiety Factor 1						-.2019* (+)	.1555 (+)	.1019 (+)	.1303 (+)
Social anxiety Factor 2						-.0229 (+)	.0058 (+)	.2905* (+)	.0676 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 32

PROPOSED RELATIONSHIPS CONTROLLING FOR INDEX OF AMOUNT OR RECENCY OF FOOD CONSUMPTION[a] (N=52)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testoster-one	Testoster-one Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0809 (-)	-.0390 (-)	.0635 (+)	.2383* (+)	-.1212 (+)	.3206* (+)	-.1141 (+)	.2556* (+)
Self-concept Factor 1				.2684* (-)	-.0308 (-)	-.3032* (-)	.2458* (-)	-.1241 (+)	.0332 (+)
Self-concept Factor 2				.2171 (-)	-.0315 (-)	-.3594* (-)	.2321* (-)	.1202 (+)	-.0245 (+)
Social anxiety Factor 1						-.2036* (+)	.1711 (+)	.0809 (+)	.1316 (+)
Social anxiety Factor 2						-.0226 (+)	.0035 (+)	.2876* (+)	.0674 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 33

PROPOSED RELATIONSHIPS CONTROLLING FOR REPORTED FREQUENCY OF CHURCH ATTENDANCE[a] (N=52)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testoster-one	Testoster-one Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0555 (-)	-.0382 (-)	.0492 (+)	.2390* (+)	-.0537 (+)	.2794* (+)	-.0767 (+)	.2503* (+)
Self-concept Factor 1				.2406* (-)	-.0048 (-)	-.2874* (-)	.2215 (-)	-.1223 (+)	.0373 (+)
Self-concept Factor 2				.1660 (-)	-.0092 (-)	-.3604* (-)	.2029 (-)	.1054 (+)	-.0203 (+)
Social anxiety Factor 1						-.1536 (+)	.1070 (+)	.1002 (+)	.1447 (+)
Social anxiety Factor 2						-.0637 (+)	.0542 (+)	.2784* (+)	.0632 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 34

PROPOSED RELATIONSHIPS CONTROLLING FOR REPORTED AVERAGE NUMBER OF CUPS OF COFFEE CONSUMED DAILY[a] (N=52)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol time 2		.0654 (-)	-.0337 (-)	-.0057 (+)	.2241 (+)	-.0374 (+)	.2805* (+)	-.0131 (+)	.2203 (+)
Self-concept Factor 1				.2807* (-)	-.0299 (-)	-.3128* (-)	.2518* (-)	-.1395 (+)	.0350 (+)
Self-concept Factor 2				.2198 (-)	-.0304 (-)	-.3928* (-)	.2511* (-)	.0925 (+)	-.0280 (+)
Social anxiety Factor 1						-.1883 (+)	.1719 (+)	.1484 (+)	.0996 (+)
Social anxiety Factor 2						-.0179 (+)	.0025 (+)	.3101* (+)	.0602 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 35

PROPOSED RELATIONSHIPS CONTROLLING FOR REPORTED RECENCY OF SEXUAL INTERCOURSE[a] (N=52)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0651 (-)	-.0248 (-)	.0626 (+)	.2416* (+)	-.0594 (+)	.2737* (+)	-.0862 (+)	.2642* (+)
Self-concept Factor 1				.2602* (-)	-.0470 (-)	-.3112* (-)	.2624* (-)	-.1198 (+)	.0141 (+)
Self-concept Factor 2				.2051* (-)	-.0477 (-)	-.3937* (-)	.2632* (-)	.1023 (+)	-.0477 (+)
Social anxiety Factor 1						-.2045* (+)	.1851 (+)	.0947 (+)	.1115 (+)
Social anxiety Factor 2						-.0221 (+)	.0177 (+)	.3115 (+)	.0395 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 36

PROPOSED RELATIONSHIPS CONTROLLING FOR NUMBER OF CIGARETTES SMOKED DURING DAY OF "PARTY" SESSION[a] (N=60)

	Blood Alcohol Time 2	Self-concept		Social Anxiety		Cortisol	Cortisol Change	Testosterone	Testosterone Change
		Factor 1	Factor 2	Factor 1	Factor 2				
Blood alcohol Time 2		.0373 (-)	-.0427 (-)	.0364 (+)	.2172* (+)	-.0443 (+)	.2810* (+)	-.0669 (+)	.2520* (+)
Self-concept Factor 1				.2584* (-)	-.1148 (-)	-.3279* (-)	.2420* (-)	-.0862 (+)	.0310 (+)
Self-concept Factor 2				.2034* (-)	-.0588 (-)	-.3923* (-)	.2418* (-)	.1126 (+)	-.0290 (+)
Social anxiety Factor 1						-.1763 (+)	.1762 (+)	.1245 (+)	.1450 (+)
Social anxiety Factor 2						-.0224 (+)	.0101 (+)	.3447* (+)	.0821 (+)

[a]The signs in parentheses are the directions hypothesized in the guiding propositions. Observed relations significant at $p \leq .05$ are noted as informational guidelines with an asterisk (*).

TABLE 37

OBSERVED, PREDICTED AND RESIDUAL VALUES FOR MULTIPLE REGRESSION OF BLOOD ALCOHOL ON SELF-CONCEPT FACTORS, SOCIAL ANXIETY FACTORS, PRE-CORTISOL, PRE-TESTOSTERONE, AND "LIGHTER VERSUS HEAVIER DRINKER" DUMMY VARIABLES[a] (N=68)

Observed Blood Alcohol Time 2	Predicted Blood Alcohol Time 2	Residual
0.5999997	8.705497	-8.105496
11.90000	10.45681	1.443183
12.20000	10.15659	2.043406
10.50000	10.03281	0.4671814
12.30000	17.13181	-4.831822
3.900000	8.528942	-4.628942
1.699999	MISSING	MISSING
13.50000	11.17714	2.322860
12.30000	15.21259	-2.912593
11.40000	8.767290	2.632705
7.199996	8.853806	-1.653811
19.59999	17.19333	2.406646
14.50000	9.369962	5.130036
5.199999	7.530235	-2.330236
MISSING	13.92982	MISSING
9.799998	7.942826	1.857171
10.30000	9.714595	0.5854036
5.900000	8.438460	-2.538461
5.099999	6.593740	-1.493740
16.29999	10.53879	5.761197
MISSING	13.58713	MISSING
10.59999	13.35402	-2.754025
3.199999	5.720929	-2.520929
22.09999	15.72270	6.377288
8.399999	6.985671	1.414327
12.50000	14.07346	-1.573462
8.399999	14.63254	-6.232541
7.499998	7.595974	-0.9597576E-01
7.599998	5.559084	2.040913
10.59999	13.48745	-2.887453
6.699997	6.085968	0.6140288
MISSING	MISSING	MISSING
2.499999	5.860775	-3.360775
10.70000	8.713595	1.986403
21.29999	19.97739	1.322583
17.20000	23.98640	-6.786411
0.0	6.287797	-6.287796
0.0	8.352015	-8.352015

TABLE 37 (continued)

Observed Blood Alcohol Time 2	Predicted Blood Alcohol Time 2	Residual
7.699996	8.616166	-0.9161705
9.999996	12.32020	-2.320202
3.499999	8.342587	-4.842587
13.60000	10.14625	3.453750
0.0	9.479747	-9.479747
9.699994	6.630548	3.069446
3.099999	6.235274	-3.135275
16.19998	10.32225	5.877735
7.099998	10.60983	-3.509835
7.399994	9.827993	-2.427999
1.599999	3.504842	-1.904839
13.60000	7.341228	6.258769
12.10000	17.67583	-5.575832
15.90000	18.46936	-2.569370
6.799995	14.06233	-7.262338
23.59999	17.49316	6.106811
22.09999	8.344866	13.75512
25.29999	15.14528	10.15471
21.69998	14.06937	7.630610
2.099999	7.858029	-5.758030
18.39999	6.812198	11.58780
18.89999	14.57441	4.325584
18.49998	16.07008	2.429896
11.60000	9.169849	2.430150
10.70000	11.04951	-0.3495121
19.99998	11.57200	8.427986
17.09999	7.803883	9.296107
9.799998	8.722907	1.077090
4.900000	10.47477	-5.574767
5.599999	MISSING	MISSING

[a]All original values have been multiplied by 100 to expedite interpretation.

VITA

Barry S. Tuchfeld was born in Jackson, Tennessee, in 1947. He graduated from the University of Tennessee, Knoxville, in 1969 with a major in finance and a concentration in economics. As an undergraduate he served as president of various campus organizations and was also an undergraduate assistant in the Department of Finance. During his senior year he managed a men's clothing store located on campus.

After serving six months on active duty for the United States Army, he returned to Knoxville in 1970 to continue his education in economics. In the fall of 1970 he entered the graduate program in the Department of Sociology at the University of Tennessee, Knoxville. While pursuing his M.A. degree he served as a National Institute of Mental Health Research Trainee and as a Teaching Assistant in the Department of Sociology. His master's thesis was an intensive study of communality within the Knoxville Jewish community.

While studying for the Ph.D. he was fortunate in having served as a Research Assistant to Louis Dotson, the person who was to become his major professor. While under Dr. Dotson's tutelage he participated in the research project of which his doctoral dissertation was one product. Upon completion of the research he resumed his position as a Teaching Assistant and was also an Instructor in the Graduate School of Social Work in the spring of 1974. During that time he taught an advanced course in Methodology and Social Research. His professional publications to date include a research article in Demography and a book review

in Contemporary Sociology. He is also a reviewer for Choice: A Publication of the Association for College and Research Libraries.

Upon receipt of his doctorate he will assume a professional research position with the Research Triangle Institute, Research Triangle Park, North Carolina. There he anticipates gaining additional experience as a social researcher and pursuing his interest in the interrelationships among sociological, social psychological, and biological variables as they relate to human behavior, particularly with respect to health related problems.