1984

A comparison of hypnotic susceptibility levels and the acceptance of placebo suggestions during a submaximal exercise test

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A COMPARISON OF HYPNOTIC SUSCEPTIBILITY LEVELS AND THE ACCEPTANCE OF PLACEBO SUGGESTIONS DURING A SUBMAXIMAL EXERCISE TEST

by

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An Abstract

of a thesis submitted in partial fulfillment

of the requirements for the degree of

Master of Science in the School

of Health, Physical Education,

and Recreation at

Ithaca College

September 1984

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ABSTRACT

The relationship between hypnotic susceptibility and the acceptance of placebo suggestions was investigated. Ithaca College undergraduate students high in hypnotic susceptibility (n = 30) and low in hypnotic susceptibility (n = 30) were randomly assigned to either a stimulant-placebo group, a depressant-placebo group, or a control group. Each group was comprised of 20 subjects, 10 high and 10 low in hypnotic susceptibility. Each subject performed the Physical Work Capacity 150 submaximal exercise test twice. During Exercise Trial 2 subjects in the stimulant-placebo group and the depressant-placebo group received a placebo and appropriate placebo suggestions concerning their heart rate, systolic blood pressure, and the number of minutes they would be able to exercise. Subjects in the control group did not receive a placebo, but did receive directions to sit quietly for 10 minutes before Exercise Trial 2. The data were submitted to a three-way ANOVA to determine significance at the .05 level. It was concluded that placebos have the ability to significantly change a subject's heart rate and blood pressure in the desired direction suggested by the placebo. The relationship between hypnotic susceptibility and the acceptance of placebo suggestions remained unreliable and unpredictable.

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A Thesis Presented to the Faculty of
the School of Health, Physical
Education, and Recreation
Ithaca College

In Partial Fulfillment of the
Requirements for the Degree
Master of Science

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by

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September 1984

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CERTIFICATE OF APPROVAL

MASTER OF SCIENCE THESIS

This is to certify that the Master of Science Thesis of

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submitted in partial fulfillment of the requirements for the degree of Master of Science in the School of Health, Physical Education, and Recreation at Ithaca College has been approved.

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Date: June 21, 1984

DEDICATION

This thesis is dedicated to my Grandfather Charles R. Racey for his guidance throughout my life.

ACKNOWLEDGEMENTS

The investigator would like to extend the sincerest appreciation to the following people:

1. To Dr. V. L. Eskridge for her expertise in hypnosis and her guidance on this thesis.
2. To Dr. P. Frye for her statistical guidance and her patience.
3. To Dr. D. Wuest for her constant support, patience, understanding, and her advisement throughout this thesis.
4. To my family and friends for their support.

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Chapter 1

INTRODUCTION

In recent years athletes and researchers have been exploring various psychological approaches to increasing athletic performances and obtaining maximal efforts. Researchers (Cunningham, 1981; Nideffer, 1976) have been experimenting with psychological procedures such as hypnosis and behavior motivating suggestions to enhance athletic performance. Other researchers (Hillard & Folger, 1977; Kirsh, 1978) have experimented with altering performance with the power of suggestion through the use of placebos.

While suggestions have been effective in altering performance, little research has been done by researchers to determine what specific characteristics of individuals are related to the acceptance of the suggestions. Hypnotists, who rely heavily on suggestion to hypnotize subjects, have found that the suggestibility of an individual to hypnotic suggestions can be predicted via hypnotic susceptibility testing. Thus, it would seem valuable to research the relationship between hypnotic susceptibility and the acceptance or rejection of placebo suggestions for behavior change.

Many athletes have tried to develop their athletic ability with the help of hypnosis. Cunningham (1981), a sport psychologist, has reported helping various athletes with both physiological and psychological problems by means of hypnosis. Other researchers have experimented with hypnosis to enhance athletic performance in many ways, such as the reduction of competition anxiety (Nideffer, 1976), increasing muscular endurance (Johnson, 1961), and increasing cardiovascular endurance (Jackson, Gass, & Camps, 1979).

In all recent experiments involving hypnosis, subjects have been assigned to experimental groups based on their individual hypnotic susceptibility level. Subjects' susceptibility to hypnosis is determined by their responsitivity to the suggestions made during a hypnotic susceptibility test (McConkey, Sheehan, & Law, 1980). Subjects who score high on these tests are theorized to be affected to a greater extent by hypnotic suggestions than subjects who score low on the hypnotic susceptibility tests.

Similar to hypnotic suggestions, placebo suggestions have been reported to change the behavior of subjects (Marshall, 1976; Morris, 1974). A placebo is a chemically inert substance that influences a body by virtue of its presumed psychological effect (Kirsh, 1978). Shapiro (1960) reported that placebos have both a psychological and physiological influence upon subjects and patients. The direction of the behavior change is directly related to the suggestions that accompany the placebo (Bergals, 1977). Researchers have experimented with placebos to increase the output of the cardiovascular system (Marshall, 1976), and to enhance pain reduction (Botto, 1976).

It would follow, theoretically, that individuals who accept the suggestions that accompany hypnotic induction would also accept the suggestions that accompany placebo administration. However, the existence of a relationship between hypnotic susceptibility and the acceptance of placebo suggestions is controversial. Laboratory tests have shown an unreliable relationship between hypnotic susceptibility and placebo grouping (Evans, 1969; Shapiro, 1971; Thorn, 1962).

However, Wickramasekera (1980) suggested that a moderate relationship can be found between hypnotic susceptibility levels and response to placebo suggestions when using a potent placebo and controlling for any confounding variables. Thus, further research is needed to define the relationship, if any, between response to placebo suggestions and hypnotic susceptibility levels.

Scope of the Problem

This investigation will endeavor to determine if subjects high in hypnotic susceptibility are willing to accept placebo suggestions to a greater extent than subjects low in hypnotic susceptibility.

Students in various classes at Ithaca College were given the Harvard Group Scale of Hypnotic Susceptibility Test (HGSH) (Shore & Orne, 1962). Out of a possible 12 points, individuals scoring nine points or higher were classified as high in hypnotic susceptibility. Those scoring four points or lower were classified as low in hypnotic susceptibility. From a pool of potential subjects, a total of 30 subjects classified as high in hypnotic susceptibility and 30 subjects low in hypnotic susceptibility were recontacted and asked to participate in a submaximal exercise test. The subjects, when recontacted, were not told of the relationship between their participating in the HGSH and in being contacted to participate in the exercise test.

Subjects scoring high on the HGSH were randomly assigned to a stimulant-placebo group (STMP), a depressant-placebo group (DEP), or a control group (CON). Likewise, the 30 subjects scoring low on the HGSH were randomly assigned to one of these groups. Each group was comprised of 20 subjects, 10 high and 10 low in hypnotic susceptibility.

All subjects participated in the Physical Work Capacity 150 (PWC150) (Åstrand & Rohdal, 1977) submaximal exercise test. This exercise consisted of pedalling a bicycle ergometer until a criterion heart rate (HR) of 150 beats per minute (BPM) was reached, at which point the exercise was terminated. Subjects met with the researcher twice, both times performing the PWC150 exercise test. Exercise Trial 1 was done without the administration of a placebo. During Exercise Trial 2, prior to performing the exercise test, STMP group subjects received a placebo they were told was a stimulant, DEP group subjects received a placebo they were told was a depressant, and CON group subjects received instructions to sit quietly for a 10-minute interval. After placebo administration the PWC150 was performed again.

For each subject the following data was recorded: the resting HR and systolic blood pressure (SBP) of Exercise Trial 1, the pre- and post-placebo administration resting HR and SBP of Exercise Trial 2, the post-exercise HR and SBP of both exercise trials, and the number of minutes exercised for both exercise trials. The resting HR and SBP of Exercise Trial 1 were recorded as a baseline but were not compared to other parameters measured. The other measurements were statistically compared to determine if there was a significant relationship or interaction among hypnotic susceptibility by placebo grouping by trials of the exercise.

Statement of the Problem

This study was designed to investigate the relationship between high and low hypnotic susceptibility levels and the acceptance or rejection of placebo suggestions during a submaximal exercise test.

Theoretical Hypotheses

This experiment was designed to test the three-way interaction among hypnotic susceptibility by placebo grouping by trials. The two-way interactions of hypnotic susceptibility by placebo grouping, hypnotic susceptibility by trials, and placebo grouping by trials were also tested. The five parameters on which the groups were compared were: the resting HR of Exercise Trial 2, the resting SBP of Exercise Trial 2, the post-exercise HR, the post-exercise SBP, and the number of minutes exercised during the trials.

It was theorized that subjects high in hypnotic susceptibility (e.g., highly likely to accept suggestions before and during hypnotic induction) would be likely to accept the suggestions associated with a placebo. Likewise, subjects low in hypnotic susceptibility would not be likely to accept the suggestions associated with a placebo.

Specifically, STMP group subjects received a placebo they thought was digitalis, a stimulant. The accompanying suggestions for these subjects indicated that their HR and SBP would rise immediately after administration and thus it would take a fewer number of minutes of exercise to reach the criterion HR of 150 BPM. It was also indicated that their post-exercise HR and SBP would remain high.

Subjects in the DEP group received a placebo they were told was chlorazepate dipotassium, a depressant. The accompanying suggestions indicated that the subjects' HR and SBP would decrease immediately after administration, but the effort of exercise would cause an overproduction of adrenalin and thus, the HR would increase abnormally.

DEP subjects were told that it would take a fewer number of minutes of exercise to reach the criterion HR and that the post-exercise HR and SBP would remain high.

Subjects in the CON group did not receive a placebo, but were given instructions to sit quietly for a 10-minute interval. It was theorized that all subjects in the CON group would show no change in any of the parameters measured between trials.

Hypothetically, subjects in the STMP and DEP placebo groups who were high in hypnotic susceptibility would accept the placebo suggestions, while subjects who were low in hypnotic susceptibility would not accept the placebo suggestions. Since there were no suggestions given to the CON group subjects it was theorized that there would be no change at all.

It was also theorized that the placebo suggestions would control the direction of change in the HR and SBP of Exercise Trial 2. The STMP subjects would show an increase in the cardiovascular measurements. The DEP subjects would show a decrease in their resting HR and SBP, but an increase in these same measurements after the start of the exercise.

Assumptions of the Study

The following assumptions were made relative to this investigation:

1. Each student given the HGSH followed the instructions to the best of his/her ability.

2. Each subject in the placebo-exercise experiment remained naive, until the termination of the experiment, to the fact that the drug being administered was actually a placebo.

Definition of Terms

The following terms were operationally defined for the purpose of this investigation:

1. A placebo is a chemically inert substance given to subjects with accompanying suggestions. The placebo used in this investigation was 15 milligrams of lactose mixed with water and described as digitalis (a stimulant) for STMP subjects, and described as chlorazepate dipotassium (a depressant) for DEP subjects.

2. A subject high in hypnotic susceptibility is an individual who received a score between 9 and 12 on the Harvard Group Scale of Hypnotic Susceptibility Test (Shore & Orne, 1962).

3. A subject low in hypnotic susceptibility is an individual who received a score between 0 and 4 on the Harvard Group Scale of Hypnotic Susceptibility Test (Shore & Orne, 1962).

4. The Physical Work Capacity 150 (PWC150) submaximal exercise test is an exercise test on a bicycle ergometer consisting of workloads of 300 kilopounds per meter per minute (KPM), 600 KPM, 900 KMP, and 1200 KPM (Åstrand & Rohdal, 1977). The subject pedalled at each workload respectively, for 6 minutes or until the criterion HR of 150 BPM was reached.

5. The stimulant-placebo group consisted of 20 subjects, 10 high and 10 low in hypnotic susceptibility, who were told the placebo was digitalis, a stimulant.

6. The depressant-placebo group consisted of 20 subjects, 10 high and 10 low in hypnotic susceptibility, who were told the placebo was a depressant, chlorazepate dipotassium.

7. The control group consisted of 20 subjects, 10 high and 10 low in hypnotic susceptibility, who did not receive a placebo.

8. Exercise Trial 1 is the first meeting with the subject when the PWC150 was performed.

9. Exercise Trial 2 is the second meeting with a subject when the PWC150 exercise test was performed and the placebo was administered to the proper groups.

Delimitations of Study

The following are delimitations of the study:

1. Ithaca College undergraduate students, both male and female, were subjects in this study.

2. The HGSH was used to determine an individual's level of hypnotic susceptibility (Shore & Orne, 1962).

3. The PWC150 submaximal exercise test was used to raise the subjects' HRs to the criterion of 150 BPM (Åstrand & Rohdal, 1977).

4. The subjects' heart rates were recorded by palpation of carotid artery for 30 seconds.

5. The subjects' systolic blood pressures were recorded by a sphygmomanometer occluding the brachial artery.

6. The subjects in the STMP group received a placebo identified as digitalis while subjects in the DEP group received a placebo identified as chlorazepate dipotassium.

Limitations of the Study

The following are limitations of this study:

1. These findings refer only to the 1981-1982 Ithaca College students utilized in this investigation.

2. The exercise test was a submaximal test to reduce the risk of injury. The results may have been different with a maximal exercise test.

3. A different hypnotic susceptibility test may have led to subjects being classified differently in hypnotic susceptibility.

4. If the instructions to the DEP group were consistent with popular knowledge of depressants the results may have been different.

Chapter 2

REVIEW OF LITERATURE

This chapter reviews the relevant literature associated with the concepts under investigation in this experiment. The chapter is divided into five sections: (a) hypnosis, (b) hypnotic susceptibility, (c) the placebo effect, (d) a comparison between hypnotic susceptibility and the placebo effect, and (e) summary.

Hypnosis

Although hypnosis has been researched for approximately 2 centuries it actually has been known and practiced for thousands of years (Fromm & Shore, 1972). Researchers are not in agreement about the nature of hypnosis. Cunningham (1981) suggested a person under the influence of hypnosis is in a conscious state that is different from both waking and sleeping. Frankel (1978) explained hypnosis "as the experience of altered or distorted perceptions brought about as a result of ideas offered in the context of a trusting relationship, when the subjects are motivated and willing to experience them" (p. 665). Both Cunningham (1981) and Frankel (1978) believed subjects under the influence of hypnosis are in a state of heightened suggestibility.

Through the years hypnosis has been used in a variety of ways. Hypnosis is considered one of the major influences in behavior modification. Both the psychology of motivation and the study of social influence are associated with hypnosis (Fromm & Shore, 1972). Another researcher, Conn (1975), explained that hypnosis was developed by doctors and, therefore, it belongs to the medical world. Sport psychologists such as Les Cunningham have used hypnosis as a guided

relaxation technique to help athletes with their problems. Various athletes have turned to hypnosis for both psychological and physiological problems (Cunningham, 1981; Naruse, 1964; Nideffer, 1976).

There are many ways in which hypnosis can be used in the sports realm. Cunningham (1981) has used hypnosis, a powerful tool, in programming athletes to achieve top mental performance in sports. Hypnosis has been used as an extension of suggestibility (Fromm & Shore, 1972). With the proper suggestions, after hypnotic induction, athletes have solved problems of competitive anxiety (Naruse, 1964; Nideffer, 1976), physical injuries (Cunningham, 1981), and concentration difficulties (Naruse, 1964).

Although hypnosis has been used on a variety of problems, the suggestions associated with hypnosis do not have the same affects upon everyone. Subjects who easily become hypnotized are considered high in hypnotic susceptibility and readily accept the suggestions offered. Subjects who are not hypnotized easily are considered low in hypnotic susceptibility and will not readily be affected by the suggestions associated with hypnosis (McConkey, Sheehan, & Law, 1980).

Hypnotic Susceptibility

Suggestibility is an invariant, irreducible, defining feature of hypnosis (Fromm & Shore, 1972). Not everyone is susceptible to the suggestions associated with a hypnotic induction. Stein (1930) assumed that suggestibility is, in fact, hypnotizability. An individual's hypnotizability is determined when responses to standardized test suggestions are assessed after administration of a hypnotic

induction (Barber, 1964). Simply, hypnotic susceptibility assesses the responsitivity to test suggestions (McConkey, Sheehan, & Law, 1980).

Hypnosis is a state of heightened suggestibility of an individual (Cunningham, 1981). The degree to which an individual has his/her perceptions altered to a state of heightened suggestibility is his/her hypnotic susceptibility level (Frankel, Apfel, Kelly, Benson, Quinn, Newmark, & Mazmaud, 1979). Experiments by Perry and Mullen (1975) have concluded that only about 15 percent of the population are high in hypnotic susceptibility while another 15 percent of the population are not hypnotically susceptible at all.

In recent years, it has been deemed important to determine an individual's level of hypnotic susceptibility before the commencement of actual hypnosis experimentation. The Harvard Group Scale of Hypnotic Susceptibility Test (HGSH) was developed by Shore and Orne (1962) to predict an individual's level of hypntoic susceptibility. The HGSH involves administration of a series of suggestions to a subject which include head falling, eye closure, hand lowering, communication inhibition, arm immobilization, finger lock, hand moving, hallucination, eye catalepsy, post-hypnotic suggestion, and amnesia. The responsitivity to these suggestions are recorded and the number of suggestions accepted determines an individual's level of hypnotic susceptibility (Shore & Orne, 1962). The number of suggestions accepted also determines the depth of hypnotic trance an individual has achieved during the susceptibility test (Perry & Lawrence, 1980). Shore and Orne (1963) have determined that the HGSH is a valid and reliable way to measure an individual's level of hypnotic susceptibility.

Personality characteristics of individuals high and low in hypnotic susceptibility have been researched for many years. As (1963) asserted that the relationship between hypnotic susceptibility and personality characteristics is as old as hypnosis itself. However, conflicting results have been found when personality characteristics were compared with hypnotic susceptibility.

Several researchers (Dumas, 1976; Leva, 1975; London, 1976; Souheaver & Schudt, 1978) investigated the theory that individuals high in hypnotic susceptibility have an external locus of control, while individuals low in hypnotic susceptibility have an internal locus of control. In many of these experiments (Dumas, 1976; Leva, 1975; London, 1976) the locus of control theory was not supported by the data obtained.

Souheaver and Schudt (1978) found subjects high in hypnotic susceptibility are dependent upon external demands of the environment and subjects low in hypnotic susceptibility are dependent upon either external demands or their individual internal demands. However, Leva (1975) went as far as to conclude that there were no specific personality correlations with hypnotic susceptibility. Barber (1964) suggested that the difference in hypnotic susceptibility levels is due to individual personality differences in dominance, socialibility, extroversion, and neuroticism. Similarly, subjects suffering mild to severe cases of neurosis were also determined to be above average in hypnotic susceptibility (Gibson, Corcoran, & Curran, 1977). To add

to the confusion, experimenters have concluded alcoholics (Lenox & Bonny, 1976) and young children (London, 1976) were all either above average or high in hypnotic susceptibility.

Probably the most comprehensive exploration of the relationship between hypnotic susceptibility and individual characteristics was done by London (1976). He found no significant correlations between hypnotic susceptibility and height, weight, or left-right handedness. Subjects high in hypnotic susceptibility seemed to have more fun, showed slow relaxed brain waves, and had a low need to achieve; subjects low in hypnotic susceptibility were punctual and dependable.

Researchers have also investigated the stability of hypnotic susceptibility as a personality trait. Arguments focused on whether hypnotic susceptibility is a stable trait or if it changes with the needs and motivation of the individual (As, 1930). Perry and Mullen (1975) and Duff (1977) have theorized that hypnotic susceptibility is a stable trait that does not fluctuate from situation to situation. Diamond (1977) concluded that while subjects have a predetermined amount of susceptibility with proper training most people can increase their level of hypnotic susceptibility. The question of the stability of hypnotic susceptibility as a personality characteristic is still questionable according to Botto, Fisher, and Soucy (1977).

A major reason hypnotic susceptibility is tested is to determine which subjects will benefit the most from the hypnotic and post-hypnotic suggestions. Recent research has also focused on the exploration of specific activities for which hypnotic suggestions can be beneficial. Discovering the usefulness of hypnosis can be rather complex and difficult to investigate (Salzberg & DePiano, 1980).

The findings of Jackson, Gass, and Camp (1979) and Biassatto (1977) concerning the effects of post-hypnotic suggestions of muscular endurance upon subjects with different levels of hypnotic susceptibility were conflicting. Biassatto (1977) found no significant relationship between susceptibility levels and increases in muscular endurance through hypnotic suggestions. On the other hand, subjects high in hypnotic susceptibility showed an increase in muscular endurance after hypnotic suggestions, while subjects low in hypnotic susceptibility showed no change in performance in an experiment conducted by Jackson et al. (1979).

Experiments performed using hypnotic suggestions to reduce pain revealed that hypnotic susceptibility was a determining factor in the acceptance of the hypnotic suggestions (Botto, 1976; Spanos, Radtke-Bororile, Ferguson, & Jones, 1972). Subjects high in hypnotic susceptibility reported a decrease in pain after hypnotic suggestions; subjects low in hypnotic susceptibility reported no change.

In other experiments, hypnotic susceptibility was not a factor in the acceptance of the hypnotic suggestions for a change in performance on mental tasks (Salzberg & DePiano, 1980), dexterity tasks (Weisberg, 1978), or locomotor tasks (Rosehan & London, 1963). In many of these experiments there were no significances found between hypnotic susceptibility levels, and also the hypnotic suggestions did not cause a change in performance (Salzberg & DePiano, 1980; Weisberg, 1978).

The Placebo Effect

The word placebo is derived from a Latin word meaning to please (Cousins & Schiefelbain, 1978). Placebos have been used in a variety

of ways in a variety of fields and thus, Kirsh (1978) says there is no commonly accepted definition. Physically, a placebo is a chemically inert substance (Kirsh, 1978) or any object offered with an intentional, beneficial therapeutic meaning (Schwitzgebel & Traugott, 1978).

Any change observed in an individual after the administration of a placebo is known as the placebo effect or acceptance of the placebo suggestions. Shapiro (1960) explained this effect to be the psychological or physiological affect of any medication or procedure which is minimally related to the pharmocological effect of the medication. Similarly, Hillard and Folger (1977) explained the placebo effect as a situation in which a favorable response to a treatment is due to the suggestions that accompany the treatment rather than the pharmacologically active ingredients in the treatment. Wickramasekera (1980) summed it up by concluding that the placebo effect is caused by a complex psychophysiological response.

Placebos have been around as long as man has been practicing medicine (Shapiro, 1960). Many injuries and diseases were and still are being treated with help of placebos. Josepe (1974) concluded that placebos are no less important today then they were in the past. Any new medication developed must be tested against placebos in a clinical setting to verify its therapeutic value before it can be marketed (Evans, 1974).

Shapiro (1960) related that many ancient prescriptions of doubtful drug value, such as lizard blood, fly species, teeth of swine, and crocodile dung, were used to cure illness and infections. Even with

these unique prescriptions the doctors must have had a fair amount of success in curing patients because physicians were always held in high social esteem (Kent, Wilson, & Nelson, 1972; Shapiro, 1960; Wickramasekera, 1980). The effectiveness of these unorthodox prescriptions must be attributed to the associated suggestions which were relayed to the patients by the doctors (Shapiro, 1960).

Even though much research has been done on the reasons why individuals accept or reject placebos, experimenters do not agree upon the reasons that promote a physiological change in an individual. Faith in the drug, hope for a cure, and personal beliefs have all been theorized to play a role in the acceptance of the placebo suggestions (Kent et al., 1972; Shapiro, 1960). Josèpe (1974) and Shapiro (1960) stated that a major factor in the placebo effect is the trust and confidence an individual or patient places in the doctor or therapist who administers the placebo. This trusting relationship gives the patient an inner hope and belief in the medication. Kirsh (1978) explained the placebo as a procedure for mobilizing the subjects' expectations of help.

Other research investigating the placebo effect has centered around theories that placebos, although chemically inert, have a true physiological affect upon the human body. Cousins and Schiefelbain (1978) suggested placebos, or the acceptance of a placebo, can switch on the endocrine system of the body which actually causes the changes seen after the placebo administration. Marshall (1976) theorized the increase in the body's physiological activity is caused by the release of epinephrine from the brain after the administration of a placebo with accompanying suggestions.

Wickramasekera (1980) suggested that there is a relationship between the physical placebo and the ability to the accompanying suggestions to change the body's chemistry. Scheir, Gibbons, and Carver (1979) theorized that the placebo effect is brought about by the subject's ability to utilize the information that accompanies the placebo and the information in the environment.

The physical characteristics of the placebo have been explored extensively. The size, color, shape, and even smell of the placebo can affect its potency (Jacobs & Hutsmeyer, 1974; Jacob & Norden (1978) Shapiro, 1960; Wickramasekera, 1980). Jacobs and Norden (1978) concluded that the bigger and more foul smelling a placebo is, the more effective it is. These same two researchers cited an example of an actual medication failing to work because it had a pleasant smell and taste. Pills that were blue and green were associated with depressants and poisons, while red and yellow pills were associated with stimulants (Jacobs & Norden, 1978).

Marshall (1976), in a recent experiment, explored the degree to which a placebo was similar to an actual drug. Three doses of a stimulant (high, moderate, and low) were given to subjects and their reactions recorded. Another group received a placebo they thought was a stimulant and the subjects' reactions were recorded and compared to the three groups that received the actual drug. Marshall (1976) concluded that the placebo group had the same reaction as the group that received the moderate dose of the actual drug. Morris (1974) conducted an experiment that concluded the subjects in a placebo group have

an increase in heart rate after the administration of a placebo and accompanying suggestions. In an experiment by Bergals (1977), the suggestions that accompanied the placebo were successful in affecting the performance in the desired direction of subjects on an intellectual test. Spectacularly, placebos have been known to have sent fatal cancer into spontaneous remission (Kirsh, 1978).

In conclusion, experimenters agree that the potency and believability of the suggestions that accompany the placebo are key factors in the acceptance or the rejection of a placebo (Kirsh, 1978; Shapiro, 1960; Wickramasekera, 1980). Exactly how the placebo affects the body is still an undetermined psychophysiological response (Wickramasekera, 1980). Kirsh (1978) asserted "that someday we will discover how a placebo works, and at that time it will cease being a placebo and will become a therapy" (p. 257).

Powers of placebos and their effects are far-reaching. Placebos have been used in a variety of ways both in and outside of the medical world. Researchers believe that the limits of placebos have yet to be uncovered (Evans, 1974; Kirsh, 1978; Shapiro, 1960).

Comparison Between Hypnotic Susceptibility and Placebo Effects

It is hard to make an accurate and logical statement about the relationship between hypnotic susceptibility and placebo responders because of the lack of concrete personality characteristics associated with hypnotically susceptible subjects. Several experimenters have cast doubt upon any relationship between hypnotic susceptibility and the

acceptance of placebo suggestions (Evans, 1969; Shapiro, 1971; Thorn, 1962). On the other hand, Shapiro (1971) described placebo nonresponders as rigid and not psychologically minded, which is how Souheaver and Schudt (1978) described subjects low in hypnotic susceptibility.

Studies by McGlashen, Evans, and Orne (1969) and Shapiro (1971) have concluded there is no relationship between hypnotic susceptibility and placebos responders in the laboratory. But, Wickramasekera (1980) objected to generalizing these results to the clinical setting. Moderating variables such as level of attention, sympathy, credibility, and potency of the instructions were not experimentally controlled. Therefore, the lack of significant findings in the studies by Shapiro (1971) and McGlashen et al. (1969) could be misleading. Wickramasekera (1980) goes as far as predicting that there will be a reliable and strong relationship found between hypnotic susceptibility and placebo responders if all these variables can be controlled.

Subjects that respond to a placebo are affected by the suggestions associated with the placebo administration by a doctor, therapist, or experimenter (Kirsh, 1978; Shapiro, 1960; Wickramasekera, 1980). Likewise, hypnosis is a powerful tool used to place a person into a state of heightened suggestibility (Cunningham, 1981). Subjects that respond to suggestions of hypnosis readily are classified as high in hypnotic susceptibility (Frankel et al. 1979). Placebo response and hypnotic susceptibility are both based upon the acceptance of the suggestions given by the doctor, therapist or experimenter. Thus, the relationship of individuals' placebo suggestibility and their level of hypnotic susceptibility needs to be researched further.

Summary

Over the years hypnosis has been used in a variety of ways. Athletes have attempted to use hypnosis in solving both psychological and physiological problems (Cunningham, 1981; Naruse, 1964; Nideffer, 1976).

Hypnosis is a method of placing a person in a state of heightened suggestibility (Cunningham, 1981), and the degree to which any individual has his/her perceptions altered to a state of heightened suggestibility is his/her hypnotic susceptibility level (Frankel et al., 1979). The Harvard Group Scale of Hypnotic Susceptibility Test was developed by Shore and Orne (1962) to predict an individual's level of hypnotic susceptibility. Hypnotic susceptibility assesses the responsitivity of a subject to test suggestions (McConkey, Sheehan, & Law, 1980).

A placebo is a chemically inert substance (Kirsh, 1978) or any object offered with intentional beneficial therapeutic meaning (Schwitzgebel & Traugott, 1978). The placebo effect is seen when a favorable response to a treatment is due to the suggestions that accompany the placebo rather than the pharmocologically active agents in the treatment (Hillard & Folger, 1977). Wickramasekera (1980) concluded that the placebo effect is caused by a complex psychophysiological response.

Researchers disagreed on the existence of a relationship between hypnotic susceptibility and placebo suggestibility. Evans (1969), Shapiro (1971), and Thorn (1962) have all cast doubt upon the existence

of any relationship between the two. Wickramasekera (1980), however, predicted that a reliable and strong relationship will be found to exist when all confounding variables can be experimentally controlled.

Chapter 3

METHODS AND PROCEDURES

This chapter describes the methods and procedures used in this investigation. The sections of the chapter are: (a) pre-experimental requirements, (b) description of measurement instruments, (c) the placebo, (d) selection and assignment of subjects, (e) methods of data collection, (f) method of data analysis, and (g) summary.

Pre-experimental Requirements

The first requirement of this study was to obtain the services of a qualified hypnotist to administer a hypnotic susceptibility test to potential subjects. Dr. V. L. Eskridge, thesis advisor, was determined to possess the necessary qualifications and experience (Appendix C), and she agreed to perform this service.

Prior to data collection a proposal explaining the treatment of the subjects and a copy of the informed consent form (Appendix B) were submitted to the Human Subjects Committee of Ithaca College. Permission to conduct this experiment was granted by the committee in March, 1982.

Description of Measurement Instruments

The Harvard Group Scale of Hypnotic Susceptibility Test (HGSH) (Shore & Orne, 1962) was selected to identify potential subjects who were high in hypnotic susceptibility, average in hypnotic susceptibility, and low in hypnotic susceptibility. Shore and Orne (1963) found the HGSH to be high in both reliability and validity. Time was a major consideration in the selection of the HGSH; this test can be administered in approximately 1 hour or 1 full class period. Dr. Eskridge, the

administrator of the HGSH, had had numerous experiences utilizing this susceptibility test and thus was familiar with the procedures and directions (Appendix C).

Exercise tests involving large muscle movement, such as the Physical Work Capacity 150 (PWC150) exercise test, have been determined to be a valid way to measure changes in the cardiovascular system (Astrand & Rohdal, 1977). The PWC150 submaximal exercise test was derived from the Physical Work Capacity 180 maximal exercise test (Astrand & Rohdal, 1977). During the PWC150 exercise test subjects pedal a bicycle ergometer, set at various workloads, until the criterion heart rate of 150 beats per minute (BPM) is achieved. A heart rate of 150 BPM was used as a criterion for termination of the PWC150 to reduce the cardiovascular risks associated with a maximal exercise test. The heart rate of 150 BPM is well under the predicted maximal heart rate of 220 BPM minus the individual's age (McArdle, Katch, & Katch, 1981).

The Placebo

A placebo can be any drug or medication which is minimally or independently related to the pharmocological effect of the drug or medication it represents (Shapiro, 1960). Most placebos are made of an inert substance that has no or little effect upon the human body (Kirsh, 1978). In this experiment the placebo was lactose administered to subjects in a 20 milliliter beaker filled with water. This mixture was taken orally at the appropriate time during the second exercise trial.

The stimulant-placebo group (STMP) was told that the placebo was digitalis, a mild stimulant that would raise both heart rate and systolic blood pressure during exercise. The STMP group subjects were led to believe this stimulant would cause them to reach the criterion heart rate while exercising in a fewer number of minutes when compared to exercising without the stimulant. Subjects in the depressant-placebo group (DEP) were told the placebo was chlorazepate dipotassium, a mild depressant that would lower the heart rate and systolic blood pressure during rest, but would raise the heart rate and systolic blood pressure during the exercise test. The DEP subjects were also led to believe that the placebo would cause them to reach the criterion heart rate while exercising in a fewer number of minutes when compared to exercising without the depressant. Subjects in the control group (CON) did not receive a drug (placebo), but they were asked to perform the exercise test to the best of their ability. Each subject was told an elaborate story concerning the reason for the experiment to add believability and/or potency to the experiment placebo. The complete instructions given to each subject can be found in Appendix A.

Selection and Assignment of Subjects

The population of subjects that participated in this experiment consisted of Ithaca College undergraduate students. Professors who were teaching large classes during the spring semester of 1982 were contacted and permission was solicted to use their class for subject selection. The experiment was explained in its entirety to each professor and an appropriate class meeting was scheduled for the HGSH administration.

At the onset of each meeting with the classes, Dr. Eskridge relayed the standard instructions that accompany the HGSH. Any student wishing not to participate was allowed to leave at that point. If any student for any reason wished to stop participating during the test they were told that this was fine but to please sit quietly in order not to disturb other students. Students wishing to participate were told to just sit quietly and to follow the instructions to the best of their ability. At the end of the HGSH students were asked to fill out a questionnaire concerning their individual test performance.

In order for this experiment to be a blind study, Dr. Eskridge scored the HGSH questionnaire and classified the subjects according to hypnotic susceptibility levels. Subjects scoring 0 through 4 were classified as low in hypnotic susceptibility, subjects scoring 5 through 8 were classified as average in hypnotic susceptibility, and subjects scoring 9 through 12 were classified as high in hypnotic susceptibility.

The first 30 subjects classified as high in hypnotic susceptibility and the first 30 subjects classified as low in hypnotic susceptibility were randomly assigned to the STMP group, the DEP group, or the CON experimental group. The names, addresses, phone numbers and experimental group assignment, but not the hypnotic susceptibility level of these identified subjects, were given to the primary researcher by Dr. Eskridge, following the scoring of the HGSH.

Each identified subject was contacted separately by phone and asked to participate in an experiment that was being done to fulfill

the requirements of a master's degree. The subjects were not informed that the hypnotic susceptibility test and the exercise test were related until the debriefing session at the end of Exercise Trial 2.

Methods of Data Collection

Data were collected during two experimental sessions. The PWC150 submaximal exercise test was performed during each exercise trial. At Exercise Trial 1, a fictious story was told to each subject to add believability and thus potency to the placebo. Subjects were led to believe that the research concerned a drug that was banned by the International Olympic Committee (IOC), but was needed by athletes with such conditions as asthma, epilepsy, and various allergies. Each subject was asked to exercise twice, once without taking the drug (placebo), and once after the administration of a small dosage of the drug (placebo). After an explanation of the experiment (see Appendix A) subjects were asked to sign an informed consent form (Appendix B) if they were willing to participate.

Three subjects declined to participate claiming adverse feelings about taking any drugs. These subjects were replaced from the potential subject pool. Subjects who declined to participate were debriefed, thanked for their time, and requested not to tell anyone about the actual purpose of the experiment.

During Exercise Trial 1 the informed consent form was signed, and a pre-exercise heart rate and systolic blood pressure were recorded for all subjects. Each subject then performed the PWC150 exercise test. Individuals' heart rates were monitored at the end of each minute. When

a heart rate of 150 BPM was reached the exercise was terminated, but subjects were instructed to continue pedalling for 2 minutes and then to sit quietly for 1 minute while a post-exercise heart rate and systolic blood pressure was recorded.

Subjects' heart rates were determined by palpating the carotoid artery for 15 seconds, measured by a stop watch. Each subject's systolic blood pressure was determined by occluding the brachial artery with a sphygmomanometer and recording the results. Practice recording heart rates and systolic blood pressures was obtained by the primary researcher during his work in Ithaca College's undergraduate human physiology laboratory.

During Exercise Trial 2 each subject was instructed to sit quietly for 5 minutes after which a pre-placebo resting heart rate and systolic blood pressure was recorded. The STMP and DEP groups received a placebo with appropriate suggestions. The CON group subjects were instructed to sit quietly for the same amount of time but received no placebo. Ten minutes were allowed for the onset of the suggested drug effect. After this interval a post-placebo resting heart rate and systolic blood pressure were recorded.

Each subject then repeated the PWC150 exercise test with the heart rate being monitored at the end of each minute. When a criterion heart rate of 150 BPM was reached, the exercise was terminated. The warm-down procedures were the same as those followed for Exercise Trial 1. At the end of the warm-down period a post-exercise heart rate and systolic blood pressure were recorded. The subject was then debriefed and was requested not to tell anyone of the actual purpose of the experiment.

Method of Data Analysis

A 2 x 3 repeated measures factorial design was used to compare hypnotic susceptibility levels with placebo grouping with trials of the exercise test. Subjects were divided into six groups: (a) STMP group high in hypnotic susceptibility, (b) STMP group low in hypnotic susceptibility, (c) DEP group high in hypnotic susceptibility, (d) DEP group low in hypnotic susceptibility, (e) CON group high in hypnotic susceptibility, and (f) CON group low in hypnotic susceptibility. Group comparisons were based upon: (a) the number of minutes exercised for each trial, (b) the post-exercise heart rate for each trial, (c) the post-exercise systolic blood pressure for each trial, (d) the pre-placebo and the post-placebo resting heart rate, and (e) the pre-placebo and the post-placebo resting systolic blood pressure.

A BMD.P2V analysis of variance and covariance with repeated measures computer program (Dixon, 1981) was used to test significant interactions. This program compared: (a) the three-way interaction of hypnotic susceptibility with placebo grouping with trials, (b) the two-way interaction of hypnotic susceptibility with placebo grouping, (c) the two-way interaction of hypnotic susceptibility with trials, (d) the two-way interaction of placebo grouping with trials, (e) the main effect of hypnotic susceptibility, (f) the main effect of placebo grouping, and (g) the main effect of trials.

If a significant three-way interaction was found among hypnotic susceptibility by placebo grouping by trials, the data were submitted to tests for simple interactions, simple main effects, and simple simple main effects (Kirk, 1969). If no significant three-way

interaction was found, the two-way interactions were analyzed. If a significant two-way interaction was found, the data were submitted to a test of simple main effects (Kirk, 1969). Each test used a significance level of .05 as the criterion for rejection of the null hypothesis.

Summary

Ithaca College undergraduate students were given the HGSH to determine their individual level of hypnotic susceptibility. A total of 30 subjects classified as high in hypnotic susceptibility and 30 subjects classified as low in hypnotic susceptibility were randomly assigned into either a STMP group, a DEP group, or a CON group.

During Exercise Trial 1 each subject performed the PWC150 exercise test upon a bicycle ergometer. The exercise was terminated when a criterion heart rate of 150 BPM was reached. During Exercise Trial 2 subjects in the STMP group and DEP group received a drug (placebo), while subjects in the CON group received instructions to sit quietly. Each subject had their pre-placebo and post-placebo heart rate and systolic blood pressure taken. The PWC150 was performed by each subject until the criterion heart rate of 150 BPM was reached.

Statistical procedures were used to compare all six groups: (a) STMP group high in hypnotic susceptibility, (b) STMP group low in hypnotic susceptibility, (c) DEP group high in hypnotic susceptibility, (d) DEP group low in hypnotic susceptibility, (e) CON group high in hypnotic susceptibility, and (f) CON group low in hypnotic susceptibility on the parameters recorded. The parameters recorded were: (a) the number of minutes exercised during each exercise trial, (b) the

post-exercise heart rate for each trial, (c) the post-exercise systolic blood pressure of each trial, (d) the pre-placebo and post-placebo heart rate of Exercise Trial 2, and (e) the pre-placebo and post-placebo systolic blood pressure of Exercise Trial 2. A 2 x 3 repeated measures factorial design was used to compare hypnotic susceptibility with placebo grouping with trials. A .05 significance level was used to determine statistical significance for all tests.

Chapter 4

RESULTS

This chapter describes the results obtained from the performances of subjects in the stimulant-placebo group (STMP), the depressant-placebo group (DEP), and the control group (CON) upon the Physical Work Capacity 150 (PWC150) exercise test. The reporting of this data is divided into five sections corresponding to the five dependent variables: (a) post-exercise heart rate, (b) post-exercise systoloc blood pressure, (c) resting heart rate, (d) resting systolic blood pressure, and (e) number of minutes exercised. Table 1 lists the abbreviations used in the ANOVA summary tables. A summary of results concludes this chapter.

Post-Exercise Heart Rate

Test of Interactions

Hypothesis 1. There will be no significant three-way interaction among hypnotic susceptibility levels, placebo grouping, and trials upon the post-exercise heart rate (HR). To test this hypothesis the data were submitted to the three-way analysis of variance (ANOVA), the results of which can be seen in Table 2. There was no significance found, $F(2,54) = 1.82$, $p > .05$, thus the hypothesis was accepted. The non-significant interaction was followed by an analysis of the two-way interactions of hypnotic susceptibility by placebo grouping, hypnotic susceptibility by trials, and placebo grouping by trials.

Hypothesis 2. There will be no significant interaction between hypnotic susceptibility and placebo grouping upon the post-exercise HR

Table 1

Abbreviations used in ANOVA Summary Tables

Abbreviation		Term
HYP	-	hypnotic susceptibility
PLAC	-	placebo grouping
STMP	-	stimulant-placebo group
DEP	-	depressant-placebo group
CON	-	control group
TR	-	trials of the experiment

Table 2

ANOVA Summary Table of Three-Way Interactions, Two-Way Interactions, and Main Effects of The Post-Exercise Heart Rate

Source	SS	df	MS	F
Mean	867680.13	1	867680.13	3181.77
HYP	388.80	1	388.80	1.43
PLAC	589.87	2	294.93	1.08
HYP by PLAC	751.20	2	375.60	1.38
Error	14726.00	54	272.70	
TR	333.33	1	333.33	11.38*
TR by HYP	30.00	1	30.00	1.02
TR by PLAC	324.27	2	162.13	5.53*
TR by HYP by PLAC	106.40	2	53.20	1.82
ERROR	1582.00	54	29.30	

*Significant at the .05 level.

The test of this two-way interaction is seen in Table 2. There was no significance found, $F(2,54) = 1.38$, $p > .05$, thus the hypothesis was accepted.

Hypothesis 3. There will be no significant interaction between hypnotic susceptibility levels and trials upon the post-exercise HR. The results of the two-way interaction test can be seen in Table 2. There was no significance found, $F(1,54) = 1.02$, $p > .05$, thus the hypothesis was accepted.

Hypothesis 4. There will be no significant interaction between placebo grouping and trials upon the post-exercise HR. The test of this two-way interaction can be seen in Table 2. There was a significant interaction found, $F(2,54) = 5.53$, $p < .05$, thus the hypothesis was rejected. Further statistical procedures were required to determine the location of this interaction. The simple main effects of placebo grouping by trials of the post-exercise HR were tested. There was no significance found among placebo grouping upon Trial 1 of the post-exercise HR, $F(2,54) = 1.61$, $p > .05$, or among placebo groupings upon Exercise Trial 2 of the post-exercise HR, $F(2,54) = 2.17$, $p > .05$, which can be seen in Table 3. There were no significant differences found between the trials of the post-exercise HR for subjects in the DEP, $F(1,54) = 1.34$, $p > .05$, or for subjects in CON, $F(1.54) = .03$, $p > .05$, as seen in Table 3. There was a significant difference found between trials of the post-exercise HR for subjects in the STMP, $F(1,54) = 9.86$, $p < .05$ (see Table 3), with the post-exercise HR for Exercise Trial 2 significantly higner than the post-exercise HR for Exercise Trial 1 for subjects in the STMP.

Table 3

ANOVA Summary Table of Post-Exercise

Heart Rate Simple Main Effects

Source	SS	df	MS	F
PLAC at TR_1	391.04	2	195.52	1.61
PLAC at TR_2	532.20	2	266.10	2.17
Error MS_{TR} by subjects within groups			121.40	
TR at STMP	577.60	1	577.60	9.86*
TR at DEP	78.4	1	78.40	1.34
TR at CON	1.7	1	1.70	.03
Pooled Error			58.50	

*Significant at the .05 level.

Tests of Main Effects

The non-significant two-way interaction involving hypnotic susceptibility was followed by an analysis of the main effects of differences in high and low hypnotic susceptibility levels upon the post-exercise HR. Because of the significant two-way interaction of placebo grouping by trials an analysis of placebo groupings or trials would have been misleading. Interpretation of the simple main effects of hypnotic susceptibility is appropriate.

Hypothesis 5. There will be no significant difference between high and low hypnotically susceptible subjects upon the post-exercise HR. The test of this difference was found not to be significant, $F(1,54) = 1.43$, $p > .05$ (see Table 2).

Post-Exercise Systolic Blood Pressure

Test of Interaction

Hypothesis 1. There will be no significant interaction among hypnotic susceptibility, placebo grouping, and trials upon the post-exercise systolic blood pressure (SBP). To test this hypothesis the data were submitted to a three-way ANOVA, the results of which can be seen in Table 4. There was no significance found, $F(2,54) = 1.53$, $p > .05$, thus the hypothesis was accepted. The non-significant interaction was followed by an analysis of the two-way interactions of hypnotic susceptibility by placebo grouping, hypnotic susceptibility by trials, and placebo grouping by trials.

Hypothesis 2. There will be no significant interaction between hypnotic susceptibility and placebo grouping upon the post-exercise SBP.

Table 4

ANOVA Summary Table of Three-Way Interactions, Two-Way Interactions, and Main Effects of the Post-Exercise Systolic Blood Pressure

Source	SS	df	MS	F
Mean	2056177.20	1	2056177.20	12552.83
HYP	38.53	1	38.53	.24
PLAC	187.65	2	93.83	.57
HYP by PLAC	54.32	2	27.16	.17
Error	8845.30	54	163.80	
TR	2.13	1	2.13	.08
TR by HYP	97.2	1	97.20	3.79
TR by PLAC	74.72	2	37.36	1.46
TR by HYP by PLAC	78.65	2	39.33	1.53
Error	1384.30	54	25.64	

The test of this two-way interaction can be seen in Table 4. There was no significance found, $F(2,54) = .17$, $p > .05$, thus the hypothesis was accepted.

Hypothesis 3. There will be no significant interaction between hypnotic susceptibility and trials upon the post-exercise SBP. The test of this interaction can be seen in Table 4. There was no significance found, $F(2,54) = 1.46$, $p > .05$, thus the hypothesis was accepted.

Test of Main Effects

Because there were no significant two-way interactions found, the main effects of hypnotic susceptibility, placebo grouping, and trials upon the post-exercise SBP could be interpreted directly.

Hypothesis 5. There will be no significant difference between hypnotic susceptibility levels upon the post-exercise SBP. The results of this test can be seen in Table 4. There was no significance found, $F(1,54) = .24$, $p > .05$, thus the hypothesis was accepted.

Hypothesis 6. There will be no significant difference among placebo groups upon the post-exercise SBP. The results of this test can be seen in Table 4. There was no significance found, $F(2,54) = .57$, $p > .05$, thus the hypothesis was accepted.

Hypothesis 7. There will be no significant difference between trials upon the post-exercise SBP. The results of this test can be seen in Table 4. There was no significance found, $F(1,54) = .08$, $p > .05$, thus the hypothesis was accepted.

Resting Heart Rate of Exercise Trial 2

Test of Interactions

Hypothesis 1. There will be no significant interaction among

hypnotic susceptibility by placebo grouping by trials upon the resting HR of Exercise Trial 2. To test this hypothesis the data were submitted to a three-way ANOVA, the results of which can be seen in Table 5. There was a significant interaction found, $F(2,54) = 4.46$, $p < .05$, thus the hypothesis was rejected. Because there was a significant three-way interaction, further statistical procedures were required to identify the location of the significance. The first step was to look at the simple interactions of trials of the resting heart rate upon hypnotic susceptibility by placebo grouping, placebo grouping upon hypnotic susceptibility by trials, and hypnotic susceptibility upon placebo grouping by trials of the resting heart rate.

There was no significance found in the resting heart rate for the simple interaction of hypnotic susceptibility by placebo grouping at the pre-placebo administration (pre-pl) HR, $F(1,54) = 2.69$, $p > .05$. The non-significant interaction was followed by an analysis of the simple main effects between hypnotic susceptibility levels, $F(1,54) = .19$, $p > .05$, or among placebo groups, $F(2,54) = .42$, $p > .05$. These results can be seen in Table 6.

There was significance found in the resting HR for the simple interaction of hypnotic susceptibility by placebo grouping at the post-placebo administration (post-pl) HR, $F(1,54) = 4.93$, $p < .05$. This dictated an analysis of the simple simple main effects. There were no significant differences found in the post-pl HR identified by the simple simple main effects between high and low hypnotically susceptible subjects for STMP subjects, $F(1,54) = 1.48$, $p > .05$, for DEP subjects, $F(1,54) = 3.20$, $p > .05$, or for CON subjects,

Table 5

ANOVA Summary Table of Three-Way Interactions, Two-Way Interactions, and Main Effects of the Resting Heart Rate of Exercise Trial 2

Source	SS	df	MS	F
Mean	603359.01	1	603359.01	5500.04
HYP	11.41	1	11.41	.10
PLAC	762.02	2	381.01	3.47
HYP by PLAC	360.22	2	180.11	1.67
Error	5923.85	54	109.70	
TR	12.68	1	12.68	1.21
TR by HYP	9.08	1	9.08	.86
TR by PLAC	981.35	2	490.68	46.66*
TR by HYP by PLAC	97.55	2	48.76	4.64*
Error	567.85	54	10.52	

*Significant at the .05 level.

Table 6

ANOVA Summary Table for Interaction Involving Trials for the Resting Heart Rate of Exercise Trial 2

Source	SS	df	MS	F
HYP/PLAC at TR1	161.54	1	161.54	2.69
HYP at TR1	19.55	1	19.55	.19[a]
PLAC at TR1	50.04	2	25.02	.42[b]
HYP/PLAC at TR2	296.53	1	296.53	4.93*
HYP at STMP/TR2	88.20	1	88.20	1.48
HYP at DEP/TR2	192.20	1	192.20	3.20
HYP at CON/TR2	16.20	1	16.20	.27
PLAC at HYPhi/TR2	36.07	2	18.04	.30
PLAC at HYPlo/TR2	327.87	2	163.94	2.73
Error			60.11	

[a]Error term is MS subjects within groups.

[b]Error term is MSTR x subjects within groups.

*Significant at the .05 level.

$F(1,54) = .27$, $p > .05$ (see Table 6). There were also no significant differences found in the post-pl HR identified by the simple simple main effects among placebo group subjects high in hypnotic susceptibility, $F(2,54) = 2.73$, $p > .05$, or among placebo groups low in hypnotic susceptibility, $F(2.54) = .30$, $p > .05$. These results can be seen in Table 6.

The second set of data tested for simple interaction effects on the resting HR of Exercise Trial 2 was hypnotic susceptibility by trials at placebo groupings. There was no significance found in the resting HR for the simple interaction of hypnotic susceptibility by trials of the DEP subjects, $F(2,54) = .27$, $p > .05$, as seen in Table 7. The non-signficant interaction was followed by an analysis of the simple main effects. There was no significant difference found in the resting HR for DEP subjects identified by the simple main effects between subjects high and low in hypnotic suscpetibility, $F(2,54) = 2.71$, $p > .05$ (see Table 7). However, there was a significant difference found in the resting HR for DEP subjects identified by the simple main effects between trials, $F(2,54) = 14.12$, $p < .05$ (see Table 7). A comparison of the means indicates that the post-pl HR for subjects in the DEP was significantly lower than the pre-pl HR.

There was no significance found in resting HR for the simple interaction of hypnotic susceptibility by trials for the CON subjects, $F(2,54) = .23$, $p > .05$ (see Table 7). The non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences found in the resting HR for CON subjects

Table 7

ANOVA Summary Table for Interactions Involving Placebo Grouping for the Resting Heart Rate Of Exercise Trial 2

Source	SS	df	MS	F
HYP/TR of DEP	5.52	2	2.81	.27[a]
HYP of DEP	297.03	1	297.03	2.17
TR of DEP	297.03	1	297.03	14.21*
HYP/TR at CON	4.90	2	2.45	.23[a]
HYP at CON	62.5	1	62.50	.57
TR at CON	8.10	1	8.10	.36
HYP/TR of STMP	96.10	2	48.05	4.57[a]*
HYP at STMP/TR_1	20.00	1	20.00	.33
HYP at STMP/TR_2	192.20	1	192.20	3.20
TR at STMP/HYP_{HI}	649.80	1	649.80	61.28[a]*
TR at STMP/HYP_{LO}	135.20	1	135.20	12.86[a]*
Error			60.11	

[a]Error term = MS_{TR} x subjects within groups.

*Significant at the .05 level.

identified by the simple main effects between high and low hypnotic susceptibility, $F(2,54) = .57$, $p > .05$, or between trials, $F(2,54) = .33$, $p > .05$. These results can be seen in Table 7.

There was significance found in the resting HR for the simple interaction of hypnotic susceptibility by trials for STMP subjects, $F(2,54) = 4.57$, $p < .05$ (see Table 7). This dictated an analysis of the simple simple main effects. There were no significant differences found in the pre-pl HR of STMP subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = .33$, $p > .05$, for the post-pl HR of STMP subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = 3.20$, $p > .05$ (see Table 7). There were significant differences in the resting HR for STMP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 61.82$, $p < .05$, and for STMP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 12.86$, $p < .05$. These results can be seen in Table 7. A comparison of these means indicated that the post-pl HR of STMP subjects, both high and low in hypnotic susceptibility, were significantly higher than the pre-pl HR.

The third set of data tested for simple interaction effects on the resting HR of Exercise Trial 2 was placebo grouping by trials at hypnotic susceptibility levels. There was significance found in the resting HR for the interaction of placebo grouping by trials at the high hypnotic susceptibility level, $F(1,54) = 79.16$, $p < .05$ (see Table 8). This dictated an analysis of the simple simple main effects.

There were no significant differences found in the pre-pl HR of subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups, $F(2,54) = 1.46$, $p > .05$, or in the post-pl HR of subjects high in hypnotic susceptibility identifed by the simple simple main effects among placebo groups, $F(2,54) = .30$, $p > .05$. These results can be seen in Table 8. There was a significant difference found in the resting HR of DEP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 18.28$, $p < .05$ (see Table 8). A comparison of means indicated that the post-pl HR of DEP subjects high in hypnotic susceptibility was significantly lower than the pre-pl HR. There was also a significant difference found in the resting HR of STMP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials as previously recorded.

There was significance found in the resting HR for the simple interaction of placebo grouping by trials at the low in hypnotic susceptibility level, $F(1,54) = 23.32$, $p < .05$ (see Table 8). This dictated an analysis of the simple simple main effects. There were no significant differences found in the pre-pl HR of subjects low in hypnotic susceptibility identified by the simple simple main effects among placebo group, $F(2,54) = 3.28$, $p > .05$ (see Table 8), or for the post-pl HR subjects low in hypnotic susceptibility identified by the simple simple main effects among placebo groups as previously recorded. There was also no significance found in the resting HR of

Table 8

ANOVA Summary Table for Interaction Involving Hypnotic Susceptibility For Resting Heart Rate of Exercise Trial 2

Source	SS	df	MS	F
PLAC/TR at HYP_{HI}	832.50	1	832.50	79.16[a]*
PLAC at HYP_{HI}/TR_1	175.20	2	87.60	1.46
PLAC at HYP_{HI}/TR_2	36.07	2	18.04	.30
TR at HYP_{HI}/DEP	192.20	1	192.20	18.28*
PLAC/TR at HYP_{LO}	245.30	1	245.30	23.32[a]*
PLAC at HYP_{LO}/TR_1	394.32	2	197.16	3.28
TR at HYP_{LO}/DEP	110.45	1	110.45	10.51[a]*
TR at HYP_{LO}/STMP	135.20	1	135.20	12.86[a]*
TR at HYP_{LO}/CON	.20	1	.20	.02[a]
Error			60.11	

[a]Error term is MS_{TR} x subjects within groups.

*Significant at the .05 level.

CON subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = .02$, $p > .05$ (see Table 8). There was a significant difference in the resting HR for DEP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 10.51$, $p < .05$ (see Table 8). A comparison of the means indicated that the post-pl HR for DEP subjects low in hypnotic susceptibility was significantly lower than the pre-pl HR. There was also a significant difference in the resting HR of STMP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials as previously recorded.

Because a significant three-way interaction among hypnotic susceptibility by trials by placebo grouping was found, looking at the two-way interaction F-test values would be misleading. This same statistical logic also holds true for looking at the F-test values of the main effects.

Resting Systolic Blood Pressure

Tests of Interactions

Hypothesis 1. There will be no significant interaction among hypnotic susceptibility, placebo grouping, and trials of the resting SBP of Exercise Trial 2. To test this hypothesis the data were submitted to a three-way ANOVA the results of which can be seen in Table 9. There was a significant three-way interaction found, $F(2,54) = 7.60$, $p < .05$, thus the hypothesis was rejected. Further statistical procedures were required to identify the location of this interaction. The first step was to look at the simple interactions

Table 9

ANOVA Summary Table of Three-Way Interaction, Two-Way Interaction, And Main Effects for Resting Systolic Blood Pressure of Exercise Trial 2

Source	SS	df	MS	F
Mean	1708137.41	1	1708137.41	10698.83
HYP	33.08	1	33.08	.21
PLAC	269.12	2	134.56	.84
HYP by PLAC	443.45	2	221.73	1.39
Error	8621.45	54	159.66	
TR	9.08	1	9.08	.84
TR by HYP	6.08	1	6.08	.56
TR by PLAC	414.65	2	207.33	19.11*
TR by PLAC by HYP	164.85	2	84.43	7.60
Error	585.85	54	10.85	

*Significant at the .05 level.

of trials of the resting SBP at hypnotic susceptibility by placebo grouping, placebo grouping at hypnotic susceptibility by trials of the resting SBP, and hypnotic susceptibility levels at placebo grouping by trials of the resting SBP.

The first set of data tested for simple interaction effects on the resting SBP was hypnotic susceptibility by placebo grouping. There was no significance found in the resting SBP for the simple interaction of hypnotic susceptibility by placebo grouping at the pre-pl administration, $F(1,54) = 3.07$, $p > .05$ (see Table 8). The non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences in the pre-pl SBP identified by the simple main effects between hypnotic susceptibility levels, $F(1,54) = .42$, $p > .05$, or among placebo groups, $F(2.54) = .15$, $p > .05$. These results can be seen in Table 10. There was significance found in resting SBP for the simple interaction for hypnotic susceptibility by placebo grouping at the post-pl administration, $F(1.54) = 5.10$, $p < .05$ (see Table 10). There were no significant differences found in the post-pl SBP identified by the simple simple main effects betwen high and low hypnotically susceptible subjects in the STMP, $F(1,54) = .22$, $p > .05$, or DEP, $F(1,54) = 3.88$, $p > .05$, or the CON group, $F(1.54) = 1.08$, $p > .05$. These results can be seen in Table 10. There were also no significant differences found in the post-pl SBP identified by the simple simple main effects among placebo groups high in hypnotic susceptibility, $F(2,54) = 1.12$, $p > .05$, or among placebo groups low in hypnotic susceptibility, $F(2,54) = 1.14$, $p > .05$ (see Table 10).

Table 10

ANOVA Summary Table of Interactions Involving Trials Upon the Resting Systolic Blood Pressure Exercise Trial 2

Source	SS	df	MS	F
HYP/PLAC at TR_1	228.70	1	228.70	3.07
HYP at TR_1	45.66	1	45.66	.42[a]
PLAC at TR_1	22.04	2	11.02	.15
HYP/PLAC at TR_2	379.57	1	379.57	5.10*
HYP at DEP/TR_2	288.80	1	288.80	3.88
HYP at STMP/TR_2	16.20	1	16.20	.22
HYP at CON/TR_2	80.00	1	80.00	1.08
PLAC at HYP_{HI}/TR_2	166.67	2	83.34	1.12
PLAC at HYP_{LO}/TR_2	169.87	2	84.94	1.14
Error			84.25	

[a]Error term = MS within subjects group.

*Significant at the .05 level.

The second set of data tested for simple interaction effects on the resting SBP was hypnotic susceptibility by trials at placebo grouping. There was no significant simple interaction of hypnotic susceptibility by trials for DEP subjects, $F(2,54) = 2.21$, $p > .05$ (see Table 11). The non-significant interaction was followed by the simple main effects there was no significant difference found in the resting SBP for DEP subjects identified by the simple main effects between trials, $F(2,54) = 12.49$, $p < .05$ (see Table 11). A comparison of means indicated that the post-pl SBP of DEP subjects was significantly lower than the pre-pl SBP.

There was significance found in the resting SBP for the simple interaction of hypnotic susceptibility by trials for STMP subjects, $F(2,54) = 5.65$, $p < .05$ (see Table 11). This dictated an analysis of the simple simple main effects. There were no significant differences found in the pre-pl SBP of STMP subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(2,54) = 1.82$, $p > .05$, or in the post-pl SBP of STMP subjects identified by the simple simple main effects between hypnotic susceptibility levels as previously recorded. There was also no significant difference found in the resting SBP of STMP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(2,54) = .07$, $p > .05$ (see Table 11). However, there was a significant difference found in the resting SBP for STMP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(2,54) = 25.21$, $p < .05$ (see Table 11). A comparison of the means indicated that the post-pl SBP of STMP subjects high in hypnotic susceptibility was significantly higher than the pre-pl SBP.

Table 11

ANOVA Summary Table for Interactions Involving Placebo Groups On tne Resting Systolic Blood Pressure of Exercise Trial 2

Source	SS	df	MS	F
HYP/TR at DEP	48.00	2	24.00	2.21
HYP at DEP	39.60	2	19.80	1.83
TR at DEP	270.90	2	135.20	12.49[a]*
HYP/TR at STMP	122.50	2	61.25	5.65*
HYP at STMP/TR_1	135.20	1	135.20	1.82
TR at STMP/HYP_{LO}	.80	1	.80	.07[a]
TR at STMP/HYP_{HI}	273.80	1	273.80	25.21[a]*
HYP/TR at CON	.02	2	.01	.00
HYP at CON	21.10	2	10.55	.98
TR at CON	1.23	2	.62	.06
Error			84.25	

[a]Error term = MS_{TR} x subjects within groups.

*Significant at the .05 level.

There was no significance found in the resting SBP for the simple interaction of hypnotic susceptibility by trials for CON group subjects, $F(2,54) = .00$, $p > .05$ (see Table 11). This non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences in the resting SBP of CON subjects identified by the simple main effects between hypnotic susceptibility levels, $F(2,54) = .98$, $p > .05$, or of CON subjects identified by the simple main effects between trials, $F(2,54) = .06$, $p > .05$. These results can be seen in Table 11.

The third set of data tested for simple interaction effects on the resting SBP was placebo grouping by trials at hypnotic susceptibility levels. There was significance found in the resting SBP for the simple interaction of placebo grouping by trials at the high hypnotic susceptibility level, $F(1,54) = 50.92$, $p < .05$ (see Table 12). This dictated an analysis of the simple simple main effects. There were no significant differences found in the pre-pl SBP of subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups, $F(2,54) = .57$, $p > .05$ (see Table 12), or in the post-pl SBP of subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups as previously recorded. There was also no significance found in the resting SBP for CON subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = .04$, $p > .05$ (see Table 12). There was a significant difference found in the resting SBP for DEP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 25.21$, $p < .05$ (see Table 12). A

Table 12

ANOVA Summary Table for Interactions Involving Hypnotic Susceptibility Levels for the Resting Systolic Blood Pressure of Exercise Trial 2

Source	SS	df	MS	F
PLAC/TR at HYP_{HI}	547.96	1	547.96	50.69*
PLAC at HYP_{HI}/TR_1	84.07	2	42.04	.57
PLAC at HYP_{HI}/TR_2	273.80	2	136.90	25.21*
TR at HYP_{HI}/CON	.45	1	.45	.04[a]
PLAC/TR at HYP_{LO}	31.60	1	31.60	2.91
PLAC at HYP_{LO}	4.46	2	2.23	.19[a]
TR at HYP_{LO}	13.40	1	13.40	.18[b]
Error			84.25	

[a]Error term = MS_{TR} x subjects within groups.

[b]Error term = MS subjects within groups.

*Significant at the .05 level.

comparison of the means indicated that the post-pl SBP for DEP subjects high in hypnotic susceptibility were significantly lower than the pre-pl SBP. There was also a significant difference found in the resting SBP for STMP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials as previously recorded.

There was also no significance found in the resting SBP for the simple interaction of placebo grouping by trials at the low in hypnotic susceptibility level, $F(1,54 = 2.91$, $p > .05$ (see Table 12). This non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences found in the resting SBP for subjects low in hypnotic susceptibility identified by the simple main effects among placebo groups, $F(2,54) = .19$, $p > .05$, or in the resting SBP for subjects low in hypnotic susceptibility identified by the simple main effects between trials, $F(2,54) = .18$, $p > .05$ (see Table 12).

Because there was a significant three-way interaction among placebo grouping by hypnotic susceptibility by trials of the resting SBP, looking at the two-way interaction F-test values would be misleading. This same statistical logic holds true for looking at the F-test values of the main effects.

Number of Minutes Exercised

Tests of Interactions

Hypothesis 1. There will be no significant three-way interaction between hypnotic susceptibility by placebo grouping by trials in the

number of minutes exercised (NME). To test this hypothesis the data were submitted to a three-way ANOVA, the results of which can be seen in Table 13. There was a significant three-way interaction found, $F(2,54) = 5.56$, $p < .05$; thus the hypothesis was rejected. Because there was a significant three-way interaction, further statistical procedures were required to identify the location of this interaction. The first step was to look at the simple interaction effects of hypnotic susceptibility by placebo grouping at trials in the NME, hypnotic susceptibility by trials at placebo grouping for the NME, and placebo grouping by trials at hypnotic susceptibility levels in the NME.

The first set of data tested for simple interaction effects in the NME was hypnotic susceptibility by placebo grouping at trials. There was significance found in the NME for the simple interaction of hypnotic susceptibility by placebo grouping at Exercise Trial 1, $F(1,54) = 2.94$, $p < .05$ (see Table 14). This dictated an analysis of the simple simple main effects. There were no significant differences found in the NME during Exercise Trial 1 for subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups, $F(2,54) = 1.60$, $p > .05$, or in the NME during Exercise Trial 1 for subjects low in hypnotic susceptibility identfied by the simple simple main effects among placebo groups, $F(2,54) = .82$, $p > .05$. These results can be seen in Table 14. There were also no significant differences found in the NME during Exercise Trial 1 by STMP subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = .00$, $p > .05$, or in the NME during

Table 13

ANOVA Summary Table of Three-Way Interactions, Two-Way Interactions, and Main Effects for the Number of Minutes Exercised

Source	SS	df	MS	F
Mean	8467.20	1	8467.20	578.92
HYP	.00	1	.00	.00
PLAC	.05	2	.03	.00
HYP by PLAC	36.95	2	18.48	1.26
Error	789.80	54	14.63	
TR	43.20	1	43.20	56.90*
TR by HYP	19.20	1	19.20	25.29*
TR by PLAC	14.15	2	7.06	9.32*
TR by HYP by PLAC	8.45	2	4.23	5.56*
Error	41.00	54	.76	

*Significant at the .05 level.

Table 14

ANOVA Summary Table for Interactions Involving Trials Upon the Number of Minutes Exercised

Source	SS	df	MS	F
HYP/PLAC at TR_1	27.30	1	27.3	3.94*
PLAC at HYP_{HI}/TR_1	22.20	2	11.10	1.60
PLAC at HYP_{LO}/TR_1	11.40	2	5.70	.82
HYP at $STMP/TR_1$	.00	1	.00	.00
HYP at CON/TR_1	.45	1	.45	.07
HYP at DEP/TR_1	36.45	1	36.45	5.26
HYP/PLAC of TR_2	17.9	1	17.9	2.85
HYP at TR_2	9.6	1	9.6	.66[b]
PLAC at TR_2	7.9	2	3.85	.56[a]
Error				

[a]Error term = MS_{TR} x subjects within group.

[b]Error term = MS subjects within group.

*Significant at the .05 level.

Exercise Trial 1 by CON subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = .07$, $p > .05$ (see Table 14). However, there was a significant difference in the NME during Exercise Trial 1 by DEP subjects identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = 5.26$, $p < .05$ (see Table 14). A comparison of the means indicated the NME by DEP subjects low in hypnotic susceptibility was greater than the NME by DEP subjects high in hypnotic susceptibility during Exercise Trial 1.

There was no significance found in the NME for the simple interaction of hypnotic susceptibility by placebo grouping at Exercise Trial 2, $F(1,54) = 2.85$, $p > .05$ (see Table 14). This non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences found in the NME during Exercise Trial 2 identified by the simple main effects between hypnotic susceptibility levels, $F(1,54) = .66$, $p > .05$, or in the NME during Exercise Trial 2 identified by the simple main effects among placebo groups, $F(2,54) = .56$, $p > .05$. These results can be seen in Table 14.

The second set of data tested for simple interaction effects in the NME was hypnotic susceptibility by trials at placebo grouping. There was significance found in the NME for the simple interaction of hypnotic susceptibility by trials at the DEP group, $F(2,54) = 9.49$, $p < .05$ (see Table 15). This dictated an analysis of the simple simple main effects. There was no significant difference found in the NME during Exercise Trial 2 identified by the simple simple main effects between hypnotic susceptibility levels for DEP subjects, $F(1,54) = .07$,

$p > .05$ (see Table 15). There was a significant difference in the NME by DEP subjects during Exercise Trial 1 identified by the simple simple main effects between hypnotic susceptibility levels as previously recorded. There was no significant difference found in the NME by DEP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = .59$, $p > .05$ (see Table 15). However, there was a significant difference found in the NME for DEP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 48.02$, $p < .05$ (see Table 15). A comparison of means indicated that the DEP subjects high in hypnotic susceptibility exercised for a fewer number of minutes during Exercise Trial 2 when compared to Exercise Trial 1.

There was significance found in the NME for the simple interaction of hypnotic susceptibility by trials at the STMP group, $F(2,54) = 8.69$, $p < .05$ (see Table 15). This dictated an analysis of the simple simple main effects. There was no significance found in the NME for STMP subjects during Exercise Trial 1 identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = .00$, $p > .05$ (see Table 15). There was also no significant difference found in the NME for STMP subjects during Exercise Trial 2 identified by the simple simple main effects between hypnotic susceptibility levels, $F(1,54) = 3.82$, $p > .05$ (see Table 15). No significant difference was found in the NME for STMP subjects low in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = 3.23$, $p > .05$, (see Table 15). A comparison of the means indicated that the NME by

Table 15

ANOVA Summary Table for Interactions Involving Placebo Groups Upon the Number of Minutes Exercised

Source	SS	df	MS	F
HYP/TR at DEP	14.40	2	7.2	9.49[a]*
HYP at DEP/TR_2	.45	1	.45	.07
TR at DEP/HYP_{LO}	.45	1	.45	.59[a]
TR at DEP/HYP_{HI}	36.45	1	36.45	48.02[a]*
HYP/TR at STMP	13.20	2	6.6	8.69[a]*
HYP at STMP/TR_1	.00	1	.00	.00
HYP at STMP/TR_2	26.65	1	26.65	3.82
TR at STMP/HYP_{HI}	2.45	1	2.45	3.23[a]
TR at STMP/HYP_{LO}	45.0	1	45.00	59.29[a]*
HYP/TR at CON	.02	2	.01	.01
TR at CON	5.26	2	2.81	3.70[a]
HYP at CON	1.30	2	.65	.84
Error			7.69	

[a]Error term = MS_{TR} x subjects within group.

*Significant at the .05 level.

STMP subjects high in hypnotic susceptibility exercised for a fewer number of minutes during Exercise Trial 2 when compared to Exercise Trial 1.

There was no significance found in the NME for the simple interaction of hypnotic susceptibility by trials at the CON group, $F(2,54) = .01$, $p > .05$ (see Table 15). This non-significant interaction was followed by an analysis of the simple main effects. There were no significant differences found in the NME for CON subjects identified by the simple main effects between trials, $F(2,54) = 3.70$, $p > .05$, or for the NME by CON subjects identified by the simple main effects between hypnotic susceptibility levels, $F(2,54) = .08$, $p > .05$. These results can be seen in Table 15.

The third set of data tested for simple interaction effects in the NME was placebo grouping by trials at hypnotic susceptibility levels. There was significance found in the NME for the simple interaction of placebo grouping by trials for subjects high in hypnotic susceptibility, $F(1,54) = 28.53$, $p < .05$ (see Table 16). This dictated an analysis of the simple simple main effects. There were no significant differences found in the NME during Exercise Trial 1 for subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups, $F(2,54) = 1.60$, $p > .05$, or in the NME during Exercise Trial 2 for subjects high in hypnotic susceptibility identified by the simple simple main effects among placebo groups, $F(2,54) = 1.39$, $p > .05$. These results can be seen in Table 16. There was also no significant

Table 16

ANOVA Summary Table for Interactions Involving Hypnotic Susceptibility Upon the Number of Minutes Exercised

Source	SS	df	MS	F
PLAC/TR at HYP_{HI}	21.90	1	21.90	28.83[a*]
PLAC at HYP_{HI}/TR_1	22.20	2	11.10	1.60
PLAC at HYP_{HI}/TR_2	18.60	2	9.30	1.34
TR at HYP_{HI}/CON	.45	1	.45	.59[a]
PLAC/TR at HYP_{LO}	.70	1	.70	.92[a]
PLAC at HYP_{LO}	16.24	2	8.12	1.24[a]
TR at HYP_{LO}	2.40	1	2.40	.16
Error			7.69	

[a]Error term = MS_{TR} x subjects within group.

*Significant at the .05 level.

difference found in the NME by CON subjects high in hypnotic susceptibility identified by the simple simple main effects between trials, $F(1,54) = .59$, $p > .05$ (see Table 16). There were significant differences found in the NME for both DEP and STMP subjects high in hypnotic susceptibility identified by the simple simple main effects between trials as previously recorded.

There was no significance found in the NME for the simple interaction of placebo grouping by trials at the low in hypnotic suscpetibility level, $F(1,54) = .92$, $p > .05$ (see Table 16). This non-significant interaction was followed by an analysis of the simple main effects. There were no significant susceptibility identified by the simple main effects between trials, $F(1,54) = .16$, $p > .05$, or in the NME by subjects low in hypnotic susceptibility identfied by the simple main effects among placebo groups, $F(2,54) = 1.24$, $p > .05$. These results can be seen in Table 16.

Because there was a significant three-way interaction among hypnotic susceptibility by placebo grouping by trials in NME, looking at the two-way interaction F-test values would be misleading. This same statistical logic holds true for looking at the F-test values of the main effects.

Summary of Results

Post-Exercise Heart Rate

A significant two-way interaction between placebo grouping and trials was found. After further statistical procedures, the location of this interaction was deemed unimportant to this study.

Post-Exercise Systolic Blood Pressure

There were no significant findings at all upon the post-exercise systolic blood pressure data.

Resting Heart Rate of Exercise Trial 2

A significant three-way interaction was found among hypnotic susceptibility by placebo grouping by trials of the resting heart rate of Exercise Trial 2.

A significant simple main effect was found for DEP subjects between trials of the resting heart rate with the post-pl heart rate lower than the pre-pl heart rate.

There were a total of four significant simple simple main effects found: (a) STMP subjects high in hypnotic susceptibility had a significantly higher post-pl heart rate than the pre-pl heart rate, (b) STMP subjects low in hypnotic susceptibility had a significantly higher post-pl heart rate than the pre-pl heart rate, (c) DEP subjects high in hypnotic susceptibility had a significantly lower post-pl heart rate than the pre-pl heart rate, and (d) DEP subjects low in hypnotic susceptibility had a significantly lower post-pl heart rate than pre-pl heart rate.

Resting Systolic Blood Pressure of Exercise Trial 2

A significant three-way interaction was found among hypnotic susceptibility by placebo grouping by trials of the resting SBP of Exercise Trial 2.

There was a significant simple main effect found for DEP subjects between trials with the post-pl SBP lower than the pre-pl SBP.

A total of two significant simple simple main effects were found: (a) STMP subjects high in hypnotic susceptibility had a significantly higher post-pl SBP than the pre-pl SBP, and (b) DEP subjects high in hypnotic susceptibility had a significantly lower post-pl SBP than the pre-pl SBP.

Number of Minutes Exercised

A significant three-way interaction was found among hypnotic susceptibility by placebo grouping by trials in the NME.

There were no significant simple main effects found. A total of three simple simple main effects were found to be significant: (a) DEP subjects low in hypnotic susceptibility exercised for a greater number of minutes during Exercise Trial 1 than DEP subjects high in hypnotic susceptibility, (b) DEP subjects high in hypnotic susceptibility exercised for a fewer number of minutes during Exercise Trial 2 than in Exercise Trial 1, and (c) STMP subjects high in hypnotic susceptibility exercised for a fewer number of minutes during Exercise Trial 2 than in Exercise Trial 1.

Chapter 5

DISCUSSION OF RESULTS

The purpose of this chapter is to discuss the results obtained in Chapter 4. The specific areas for discussion are the relationship between hypnotic susceptibility and placebo grouping in reference to: (a) post-exercise heart rate, (b) post-exercise systolic boood pressure, (c) post-placebo resting heart rate of Exercise Trial 2, (d) post-placebo resting systolic blood pressure of Exercise Trial 2, and (e) number of minutes exercised during each exercise trial. In addition, there is a comparison of results with previous findings and a summary.

Post-Exercise Heart Rate

It was theorized that subjects high in hypnotic susceptibility (highly likely to accept suggestions before and during hypnotic induction) would be likely to accept the suggestions associated with the placebo. Likewise, subjects low in hypnotic susceptibility would not be likely to accept the suggestions associated with the placebo. Both the stimulant-placebo group (STMP) and the depressant-placebo group (DEP) subjects received placebo suggestions indicating that their post-exercise heart rate would increase after the administration of the placebo. The control group did not receive a placebo or placebo suggestions regarding their post-exercise heart rate. A finding that the post-exercise heart rate for subjects high in hypnotic susceptibility in both the STMP and DEP groups increased after placebo administration, while the post-exercise heart rate for subjects low in hypnotic susceptibility and for all the subjects in the CON group remained the same would have supported this theory. A three-way analysis of

variance (ANOVA) among hypnotic susceptibility by placebo grouping by trials showed no change in the post-exercise heart rate for any groups of subjects. Therefore, it appeared from this data that the placebo suggestions concerning the post-exercise heart rate were not accepted by any of the groups of subjects, regardless of their hypnotic susceptibility classification.

A two-way ANOVA revealed a significant interaction between placebo grouping and trials for the post-exercise heart rate. It was hypothesized that subjects in the STMP and DEP groups would have a higher post-exercise heart rate than the CON group subjects in Exercise Trial 2. Further statistical procedures did not support this hypothesis.

Post-Exercise Systolic Blood Pressure

It was hypothesized that subjects high in hypnotic susceptibility would be likely to accept the suggestions associated with the placebo, whereas subjects low in hypnotic susceptibility would not accept the suggestions associated with a placebo. Both STMP and DEP group subjects received placebo suggestions indicating that the placebo would cause an increase in their post-exercise systolic blood pressure. The CON group subjects did not receive a placebo or placebo suggestions concerning their post-exercise systolic blood pressure. This hypothesis would have been supported by finding that the post-exercise systolic blood pressure for subjects high in hypnotic susceptibility in the STMP and DEP groups increased after placebo administration with no change in the systolic blood pressure of subjects low in hypnotic susceptibility and in all subjects in the CON group. A three-way ANOVA

among hypnotic susceptibility by placebo grouping by trials showed no significant change in the post-exercise systolic blood pressure for any of the groups. Therefore, it appeared from the data that the placebo suggestions concerning the post-exercise systolic blood pressure were not accepted by any of the groups, regardless of their hypnotic susceptibility classification.

Post-Placebo Resting Heart Rate of Exercise Trial 2

It was hypothesized that subjects high in hypnotic susceptibility would accept the suggestions associated with placebos. Likewise, subjects low in hypnotic susceptibility would not accept the suggestions associated with a placebo. Subjects in the STMP group received placebo suggestions indicating that their resting heart rate would rise after the administration of a placebo. DEP group subjects received placebo suggestions indicating that their resting heart rate would decrease after placebo administration. The subjects in the CON group did not receive a placebo or any accompanying suggestions, but they were asked to sit quietly for a 10-minute interval. If subjects high in hypnotic susceptibility in the STMP group showed an increase in their resting heart rate, and DEP subjects high in hypnotic susceptibility showed a decrease in their resting heart rate while subjects low in hypnotic susceptibility and all the CON group subjects showed no change, then the hypothesis would have been supported. A three-way ANOVA among hypnotic susceptibility by placebo grouping by trials showed a significant change in the resting heart rate of Exercise Trial 2. This interaction allowed for further statistical procedures to determine an acceptance or rejection of the theory.

Statistical testing of the simple main effects and the simple simple main effects showed that subjects in the STMP group increased their resting heart rate after the placebo administration. However, both subjects low in hypnotic susceptibility and subjects high in hypnotic susceptibility showed this significant increase. Similar tests indicated that subjects in the DEP group also were affected by the placebo suggestions as evidenced by a decrease in their resting heart rate after the placebo administration. Again, both high and low hypnotically susceptible subjects were affected. Subjects in the CON group showed no significant change in their resting heart rate after instructions to sit quietly. Therefore, it appeared that the placebo suggestions were accepted regardless of the subjects' hypnotic susceptibility classifications. It also appeared, from this data, that placebo suggestions can control the direction of change in the resting heart rate.

Post-Placebo Resting Systolic Blood Pressure of Exercise Trial 2

It was hypothesized that subjects high in hypnotic susceptibility would be likely to accept the suggestions associated with a placebo. Likewise, subjects low in hypnotic susceptibility would not accept the suggestions associated with the placebo. Subjects in the STMP group received placebo suggestions indicating that their systolic blood pressure would rise after the placebo administration. DEP group subjects received placebo suggestions that indicated that their systolic blood pressure would decrease after the placebo administration. The CON

group subjects received only instructions to sit quietly. If STMP group subjects high in hypnotic susceptibility showed an increase in their resting systolic blood pressure and the DEP group subjects high in hypnotic susceptibility showed a decrease in their resting systolic blood pressure, while all subjects low in hypnotic susceptibility and the CON group subjects showed no change in their resting systolic blood pressure, then the findings would have supported the hypothesis. A three-way ANOVA among hypnotic susceptibility by placebo grouping by trials showed a significant change in the resting systolic blood pressure after the administration of the placebo.

This allowed a statistical testing of the simple main effects and the simple simple main effects. These tests indicated that the subjects in the CON group showed no change at all in their resting systolic blood pressure after sitting quietly. However, subjects high in hypnotic susceptibility in the STMP group showed an increase in their post-placebo resting systolic blood pressure, while subjects low in hypnotic susceptibility in the STMP group showed no significant change in their resting systolic blood pressure. Therefore, it appeared from this data that subjects high in hypnotic susceptibility in the STMP group accepted the placebo suggestions but subjects low in hypnotic susceptibility did not accept the placebo suggestions. These findings supported the hypothesis. However, although subjects in the DEP group did accept the placebo suggestions as indicated by significant lower post-placebo resting systolic blood pressure, they did so regardless of

their hypnotic susceptibility classification. These findings did not support the hypothesis concerning hypnotic suggestibility but they did support the hypothesis that placebo suggestions can control the direction of the change in the resting systolic blood pressure.

Number of Minutes Exercised

It was hypothesized that subjects high in hypnotic susceptibility would accept the suggestions associated with the placebo. Likewise, subjects low in hypnotic susceptibility would not be likely to accept the suggestions associated with the placebo. Both the DEP and STMP groups received placebo suggestions implying that they would exercise for a fewer number of minutes after the placebo administration when compared to Exercise Trial 1. A finding that DEP and STMP group subjects high in hypnotic susceptibility exercised for a fewer number of minutes after the placebo administration, and CON subjects and all subjects low in hypnotic susceptibility had no change in the number of minutes exercised would have supported this hypothesis. A three-way ANOVA among hypnotic susceptibility by placebo grouping by trials showed a significant change in the number of minutes exercised.

This allowed an analysis of the simple main effects and the simple simple main effects. These tests indicated that subjects high in hypnotic susceptibility in both the STMP and DEP groups exercised for a significantly fewer number of minutes after the administration of the placebo. Subjects in the CON group and all subjects low in hypnotic susceptibility showed no change in the number of minutes exercised. Therefore, it appeared from this data that subjects high in hypnotic

susceptibility accepted the placebo suggestions, while subjects low in hypnotic susceptibility did not accept the suggestions associated with the placebo which supported the theory concerning hypnotic susceptibility.

The data for the DEP group subjects could be confounded because of a significant difference found between high and low hypnotically susceptible subjects upon the initial number of minutes exercised during Exercise Trial 1. The significant difference may have been produced by the subject's individual physical condition prior to the start of the investigation. This may have placed the groups in an unbalanced state in the beginning of the experiment.

Comparison of Results with Previous Findings

The placebo and accompanying suggestions had no significant affect upon increasing the DEP and STMP group subjects post-exercise heart rate or post-exercise systolic blood pressure. Both high and low hypnotically susceptible subjects showed no significant changes in either their post-exercise heart rate or their post-exercise systolic blood pressure of Exercise Trial 2 when compared to Exercise Trial 1. These findings coincided with those obtained by Evans (1969), Shapiro (1971), and Thorn (1962) who found no relationship between hypnotic susceptibility and placebo suggestibility.

Subjects in the DEP group showed a significant decrease in their post-placebo resting systolic blood pressure after the administration of placebo. These results are in agreement with the findings of Marshall (1976) and Morris (1974) who concluded that placebos can

affect the physiological system of the body. The change was also in the desired direction which is in agreement with the findings of Bergals (1977). It does not appear that there is a relationship between hypnotic susceptibility and placebo suggestibility for DEP subjects because both high and low hypnotically susceptible subjects showed a significant change in their post-placebo resting systolic blood pressure. These findings are similar to those obtained by Evans (1969), Shapiro (1971), and Thorn (1962).

On the other hand, hypnotic susceptibility level did predict the acceptance of the placebo suggestions for increasing STMP subjects' post-placebo resting systolic blood pressures. Subjects high in hypnotic susceptibility had a significantly higher post-placebo systolic blood pressure when compared to the pre-placebo recording, while subjects low in hypnotic susceptibility showed no change. The change was in the desired direction of the suggestions and this is congruent with the findings of Bergals (1977). The relationship found between hypnotic susceptibility and placebo suggestibility supports the findings of Wickramasekera (1980).

Hypnotic susceptibility levels also predicted the acceptance of the placebo suggestions for a decreased number of minutes exercised during Exercise Trial 2 for DEP and STMP group subjects. Both DEP and STMP group subjects high in hypnotic susceptibility showed a decrease in the number of minutes exercised after placebo administration, while DEP and STMP subjects low in hypnotic susceptibility showed no change in the number of minutes exercised. The CON group subjects also showed

no change in the number of minutes exercised. The findings that the placebo had some ability to change the body physiologically are similar to those reported by Marshall (1976) and Morris (1974). The change in the number of minutes exercised was in the desired direction which agreed with the findings of Bergals (1977). The ability of the hypnotic susceptibility of subjects to predict the acceptance of the placebo suggestions coincided with the theory of Wickramasekera (1980).

Summary

Hypnotic susceptibility did not predict the acceptance of the placebo suggestions for changing subjects post-exercise heart rate and systolic blood pressure. In fact, not one of the groups tested showed a significant change in either the post-exercise heart rate or the post-exercise systolic blood pressure.

The placebo and placebo suggestions changed the post-placebo resting heart rate of both high and low hypnotically susceptible subjects in the DEP and STMP groups. The change was in the desired direction which coincides with the findings of Bergals (1977). Hypnotic susceptibility level did not predict the acceptance of the placebo suggestions in these recordings which supports the findings of Evans (1969), Shapiro (1971), and Thorn (1962). The fact that the post-placebo heart rate changed supports the findings of Marshall (1976) and Morris (1974) who concluded that placebos can change a body's physiological systems.

The placebo suggestions changed the post-placebo resting systolic blood pressure of both high and low hypnotically susceptible subjects

in the DEP group. The change was in the desired direction which coincides with the findings of Bergals (1977), and physiological change supports the conclusions by Marshall (1976) and Morris (1974). The instances of finding no significant relationship between hypnotic susceptibility and placebo responding coincides with the findings of Evans (1969), Shapiro (1971), and Thorn (1962).

Hypnotic susceptibility did predict the acceptance of the placebo suggestions for a change in the post-placebo resting systolic blood pressure for STMP group subjects, and for the number of minutes exercised for both DEP and STMP group subjects. The change that occurred was in the desired direction which is similar to the findings of Bergals (1977). The ability of the placebo and placebo suggestions to cause a physiological change in the subjects coincide with the findings of both Marshall (1976) and Morris (1974). The relationship between hypnotic susceptibility and placebo acceptance supports the findings of Wickramasekera (1980).

Chapter 6

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

This chapter gives an overview of the entire experiment. The chapter is divided into three sections: (a) summary, (b) conclusions, and (c) recommendations.

Summary

A total of 60 undergraduate Ithaca College students participated in this experiment designed to investigate hypnotic susceptibility levels with the acceptance or rejection of placebo suggestions and its effect upon a submaximal exercise test. The Harvard Group Scale of Hypnotic Susceptibility Test (HGSH) was given to 241 potential subjects to determine each individual's hypnotic susceptibility level. Subjects scoring 9 through 12 were classified as high in hypnotic susceptibility while subjects scoring 0 through 4 were classified as low in hypnotic susceptibility. The first 30 subjects classified as high in hypnotic susceptibility were randomly assigned to either a stimulant-placebo group (STMP), a depressant-placebo group (DEP), or a control group (CON). The first 30 subjects classified as low in hypnotic susceptibility were randomly assigned to the same groups.

All subjects performed the Physical Work Capacity 150 (PWC150) submaximal exercise test upon a bicycle ergometer. During Exercise Trial 1 the subjects exercised on the bicycle until a criterion heart rate (HR) of 150 beats per minute (BPM) was reached. Prior to the start of the exercise during Exercise Trial 2 the subjects in the STMP received a drug (placebo) they thought was a stimulant (digitalis), and the subjects in the DEP received a drug (placebo) they thought

was a depressant (chlorazepate dipotassium); the CON group subjects received instructions to sit quietly. All subjects then performed the PWC150 exercise test once again with the criterion heart rate of 150 BPM used as a termination point for the exercise.

During Exercise Trial 1 the resting HR and systolic blood pressure were recorded. The number of minutes exercised along with the post-exercise HR and systolic blood pressure were also recorded. The parameters recorded during Exercise Trial 2 consisted of a pre-placebo resting HR and systolic blood pressure, a post-placebo resting HR and systolic blood pressure, the number of minutes exercised, and the post-exercise HR and systolic blood pressure.

A BMD.P2V analysis of variance and covariance with repeated measures computer program (Dixon, 1981) was used to test for significant three-way and two-way interactions. This program tested the three-way interaction among hypnotic susceptibility by placebo grouping by trials of the exercise test, and the two-way interactions of hypnotic susceptibility by placebo grouping, hypnotic susceptibility by trials, and placebo grouping by trials.

The data submitted to these statistical tests were (a) a comparison between the number of minutes exercised during each exercise trial, (b) a comparison between the post-exercise HR of the two exercise trials, (c) a comparison between the post-exercise systolic blood pressure of the two exercise trials, (d) a comparison between the pre-placebo and the post-placebo resting HR, and (e) a comparison between the pre-placebo and post-placebo resting systolic blood pressure of Exercise Trial 2.

Results obtained indicated that hypnotic susceptibility was not a reliable predictor for the acceptance of the placebo suggestions as measured by the post-exercise HR and systolic blood pressure. The specific placebo suggestions given to the STMP and DEP group subjects did apparantly affect a change in the desired direction for the resting HR and systolic blood pressure as indicated by an increase for STMP group subjects and a decrease for DEP group subjects. Hypnotic susceptibility level did predict the acceptance of the placebo suggestions as reflected by the number of minutes subjects exercised during Exercise Trial 2. Subjects high in hypnotic susceptibility exercised for a fewer number of minutes after placebo administration when compared to Exercise Trial 1. Subjects in the DEP group received placebo suggestions that their body would overproduce adrenalin and thus their HR would reverse from a depressed state to an excited one. Apparently DEP subjects accepted the suggestions as evidenced by the fewer number of minutes of exercise when compared to Exercise Trial 1. The CON group showed no significant changes in any parameter between trials, and this finding is congruent with what was hypothesized.

It was hypothesized that there would be a positive relationship between hypnotic susceptibility levels and the acceptance of placebo suggestions. This experiment did not show a strong or reliable relationship between levels of hypnotic susceptibility and the acceptance of placebo suggestions which is consistent with the findings of Evans (1969), Shapiro (1971), or Thorn (1962). On the other hand, this experiment supported the theory that placebos have the ability to

change or influence the cardiovascular system of subjects in the desired direction of the suggestions. These data coincided with the theories and findings of Marshall (1976), Morris (1974), Shapiro (1960), and Wickramasekera (1980).

Conclusions

1. The post-exercise heart rate was not significantly affected by the placebo suggestions for any of the hypnotic susceptibility levels. It does not appear that there is a relationship between hypnotic susceptibility and the acceptance of placebo suggestions concerning the post-exercise heart rate.

2. The post-exercise systolic blood pressure was not significantly affected by the placebo suggestions for any of the hypnotic susceptibility levels. It does not appear that there is a relationship between hypnotic susceptibility and the acceptance of placebo suggestions concerning the post-exercise systolic blood pressure.

3. The post-placebo administration resting heart rate of subjects in the STMP group was affected by the placebo suggestions. Subjects in the STMP group accepted the placebo suggestions for an increased heart rate. It does not appear, however, that hypnotic susceptibility is a reliable predictor of this acceptance of placebo suggestions because both high and low hypnotically susceptible subjects were affected by the suggestions.

4. The post-placebo administration resting heart rate of subjects in the DEP group subjects accepted the placebo suggestions for a

decrease in heart rate. It does not appear, however, that hypnotic susceptibility was a reliable predictor of this acceptance of these placebo suggestions because both high and low hypnotically susceptible subjects accepted the placebo suggestions.

5. The hypnotic susceptibility level of subjects in the STMP group predicted the acceptance of placebo suggestions for an increase in the post-placebo administration resting systolic blood pressure. Subjects high in hypnotic susceptibility accepted the placebo suggestions for increasing their systolic blood pressure, while subjects low in hypnotic susceptibility did not accept the placebo suggestion for increasing their systolic blood pressure.

6. The post-placebo resting systolic blood pressure was affected by the placebo suggestions. Subjects in the DEP accepted the placebo suggestions for decreasing their systolic blood pressure. Hypnotic susceptibility was not a predictor of the acceptance of placebo suggestions because both high and low hypnotically susceptible subjects accepted the placebo suggestions.

7. The hypnotic susceptibility level of the subjects in the STMP did predict the acceptance of the placebo suggestions for the number of minutes exercised. Subjects high in hypnotic susceptibility accepted the placebo suggestion for decreasing the number of minutes exercised during Exercise Trial 2. Subjects low in hypnotic susceptibility did not accept the placebo suggestions for decreasing the number of minutes exercised during Exercise Trial 2.

8. The hypnotic susceptibility level of subjects in the DEP group predicted the acceptance of the placebo suggestions for the number of minutes exercised. Subjects high in hypnotic susceptibility accepted the placebo suggestions for decreasing the number of minutes exercised during Exercise Trial 2. The subjects low in hypnotic susceptibility in the DEP did not accept the placebo suggestions for decreasing the number of minutes exercised during Exercise Trial 2.

Recommendations

The following recommendations are being made for further research on this topic:

1. A physical work capacity test with smaller work load increments could be used. This would prevent a significant increase in subjects' heart rate when changing from one workload to another.

2. A maximal exercise test could be substituted for a submaximal exercise test. This could eliminate confounding variables associated with a submaximal exercise test such as activity before the test, pre-test diet, and pre-test anxiety.

3. The physiological parameters measured could be monitored by more highly sensitive instruments. Subjects' heart rates could be measured by electrocardiographs, and subjects' oxygen uptake could be measured by a Max Plenck Respirometer, for example.

4. The placebo suggestion associated with the depressant placebo group could be changed to eliminate confusion. Suggestions that the depressant group may produce a low heart rate and systolic blood pressure

during the exercise would permit the subjects to exercise longer before reaching the criterion heart rate. This may produce radically different results.

Appendix A

INSTRUCTIONS TO THE SUBJECTS DURING THE EXERCISE TEST

Each subject was greeted by the investigator and it was explained that the research was being done to fulfill the requirements for a master's thesis. A false story was then told by the investigator to each placebo group to add potency and believability to the experiment.

Stimulant-Placebo Group

The subjects in this group were told the research was being done in cooperation with Dr. Margret Strazinsky (a fictional individual) from the University of Maryland. It was explained that Dr. Strazinsky was researching the effects of a drug called digitalis upon the circulatory system during exercise. Digitalis was described as a mild stimulant used by individuals suffering from asthma, epilepsy, and other various allergies. Athletes that have one of the diseases are not allowed to use their medication before a contest because digitalis was banned by the International Olympic Committee (IOC). Officials of the IOC claim digitalis creates an abundance of adrenalin giving these athletes an unfair advantage. What Dr. Strazinsky theorized is that in a meaningful athletic contest the body naturally produces adrenalin and thus the presence of digitalis in the body would have no significant effect. But, in nonexciting situations the presence of digitalis in the body would cause the heart rate and blood pressure of an individual to rise significantly.

Subjects were told that the experiment required two sessions. On Exercise Trial 1, the first day, subjects would be required to exercise upon the bicycle erogmeter at varying workload until their heart rate reached 150 beats per minute (BPM). On Day 2, the second Exercise Trial,

subjects would receive 15 mg of digitalis before the exercise test. The subjects were told that this drug would put them in a semi-excited state. Specifically, the subjects were told that their heart rate and blood pressure would rise. The digitalis inside the body would cause the body to produce adrenalin and thus the heart rate and blood pressure rise significantly. Subjects would exercise upon the bicycle ergometer until their heart rate reached 150 BPM. Because of the presence of digitalis it would take a fewer number of minutes of exercise to reach this criterion heart rate.

Depressant-Placebo Group

The subjects in the depressant-placebo group were told a slightly different story. Details about Dr. Strazinsky and her work at the University of Maryland were kept the same. Subjects were told the drug being studied was chlorazepate dipotassium, a mild depressant. Chlorazepate dipotassium was said to affect the automatic nervous system to produce nor-adrenalin, which depresses the circulatory system. It was also explained that people suffering from asthma, epilepsy, and various other allergies used this drug in their medication. During physical activity the nor-adrenalin in the body caused by chlorazepate dipotassium is perceived by barroreceptors in the body which, in turn, cause the pituitary gland to over-compensate and release large amounts of adrenalin. Again, subjects were told that the IOC banned the use of chlorazepate dipotassium because it would give athletes an unfair advantage.

Subjects were told the experiment required two Exercise Trials. At the first Exercise Trial the subjects were told they would exercise on a bicycle ergometer at varying workloads until a heart rate of 150

BPM was reached. During the second Exercise Trial the subjects would receive 15 mg of chlorazepate dipotassium before the start of the exercise. Subjects were told that this depressant would lower both their heart rate and blood pressure while at rest, but at the start of the exercise the overproduction of adrenalin would cause a dramatic increase in their heart rate and blood pressure. This increase would lead to a decrease in the number of minutes subjects would be able to exercise before the criterion heart rate would be reached.

At the termination of the second Exercise Trial each subject was debriefed about the entire experiment and any questions about placebos of hypnotic susceptibility were answered.

Control Group

Subjects in the control group were given the same introduction to the testing as the subjects in the stimulant-placebo group. All the reasons and details about the experiment were kept the same. It was explained that as members of the control group they would not be given the digitalis, but would be asked to perform the exercise test upon both Exercise Trials. The same parameters would be monitored in order to determine statistical significance. During the second Exercise Trial the control group subjects were told they would sit and relax rather than receiving a placebo. After this relaxation period the control group subjects would exercise again.

At the termination of the second Exercise Trial the subjects were debriefed about the entire experiment and any questions about placebos or hypnotic susceptibility were answered.

Changes in the Environment

Within the testing laboratory extra props and scenery were added to add potency to the placebo suggestions. A 2 foot by 3 foot chart of the internal sturctures of the human body hung from the wall directly in front of each subject during the exercise. Bottles of various drugs were also placed on the counter in front of the exercising subjects. The primary researcher wore a stethoscope and a white laboratory coat at all times.

Appendix B

INFORMED CONSENT FORM

STIMULANT GROUP

Purpose: To study the effects of digitalis, a mild stimulant, on heart rate during exercise.

Benefits: Various drugs that are used for therapeutic values also have side effects upon the different systems of the body. This experiment in an attempt to study the effects of one such drug during exercise.

Method: The first session will involve the subject riding a bicycle ergometer until a heart rate of 150 BMP is reached; the work loads will gradually be increased until this level is reached. Prior to the start of the second exercise session, 15 mg of digitalis will be administered. The same exercise will then be repeated until a heart rate of 150 BPM is reached.

Risk: The drug is quick acting, wears off quickly and is not addicting. The exercise may produce some muscle stiffness and soreness, so stretching and post-exercise warm down is advised.

Withdrawal: The subject has the right to withdraw from the study at any time.

Confidentiality: Results will be kept confidential. Access is limited to the investigator and advisor.

_____ YES. I am willing to participate and take responsibility for my actions. I am over 18 years.

_____ NO. I do not wish to participate.

Signed _____ Date _____

INFORMED CONSENT FORM

DEPRESSANT GROUP

Purpose: To study the effects of chlorazepate dipotassium, a depressant, on the heart rate during exercise.

Benefits: Various drugs that are used for therapeutic value also have side effects on different systems of the body. This experiment is an attempt to study the effects of one such drug.

Method: The first session will involve the subject riding a bicycle ergometer at increasing workloads until a heart rate of 150 BPM is reached. Prior to the start of the second session, 15 mg of chlorazepate dipotassium will be administered. The same exercise will then be repeated until a heart rate of 150 BPM is reached.

Risk: The drug is quick acting, wears of quickly and is not addicting, but will make you feel a little sluggish and sleepy.

Withdrawal: The subject has the right to withdraw from the study at any time.

Confidentiality: Results will be kept confidential. Access is limited to the investigator and advisor.

_____ YES. I am willing to participate and I take responsibility for my actions. I am over 18 years.

_____ NO. I do not wish to participate.

Signed _____ Date _____

INFORMED CONSENT FORM

CONTROL GROUP

Purpose: To study the effects of exercise on the heart. This will be done by measuring the heart rate during different workloads on the bicycle ergometer.

Benefits: To gain knowledge of the ratio of heart rate to workloads.

Method: The subject will ride a bicycle ergometer at increasing workloads until a heart rate of 150 BPM is reached. The subject will exercise twice within 1 week.

Risk: There will be a possibility of some muscle soreness and stiffness, so subjects are advised to stretch prior to exercise and warm down afterwards.

Withdrawal: Subjects have the right to withdraw from the study at any time.

Confidentiality: Results will be kept confidential. Access is limited to the investigator and advisor.

_____YES. I will participate and take responsibility for my actions. I am over 18 years.

_____NO. I do not wish to participate.

Signed _____ Date _____

Appendix C

QUALIFICATIONS OF DR. V. L. ESKRIDGE TO PERFORM HYPNOSIS

Current Address

School of Health, Physical Education, and Recreation

Ithaca College

Ithaca, New York 14850

Present Position

Associate Professor

Publications

"Placebo effect upon complex reaction time when hypnotic susceptibility is controlled." ERIC, SP009, May, 1976.

"The effect of a limited training in hypnosis upon reaction time." Microform Publications, Eugene, Oregon, 1972.

Symposia and Presentations

"Effects of a placebo on the balancing ability of subjects exhibiting high and low hypnotic susceptibility." Texas Academy of Science, March, 1973.

"Effects of hypnotic and placebo suggestions on performance of high and low susceptible subjects." Research section of Texas Association of Health, Physical Education, and Recreation State Convention, December, 1973.

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