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Sixty college students who had sleep difficulties in the form of taking approximately 30 minutes or longer to get to sleep at night were treated in groups by either (1) Relaxation Training (RT), (2) Slef-Regulation of Thoughts (ST), a technique similar to "Thought Stopping," where the individual learns how to stop and start his thoughts, (3) Combined Treatment (CT), a combination of RT and ST treatments, (4) Group Discussion (GD), a placebo control group in which no direct therapeutic techniques were employed, or (5) No-Treatment Control (NC), which received CT treatment subsequent to follow-up. There was a significant reduction from baseline to follow-up across all treatment groups for the following three dependent measures: latency to sleep onset, difficulty getting to sleep, and number of times awakened. There also was a significant increase in the degree of restedness from baseline to follow-up across all treatment groups. The subjects in the RT group reported significantly less difficulty getting to sleep than the NC subjects across all phases of the study. Furthermore the subjects in RT, GT, and ST conditions also reported significantly greater degrees of restedness upon awakening than subjects in the NC group across all phases of the study. A novel feature

of the experiment was the utilization of roommates to monitor subjects' sleep patterns. Roommates were reliably able to corroborate the subjects' reports regarding: time to bed, time to sleep, latency to sleep onset, and time up in the morning. Two hypotheses concerning the maintenance of insomnia, muscle tension and lack of thought regulation, were evaluated in this study. However, due to the lack of any significant interactions between the treatment and phase variables, no definite conclusions concerning these hypotheses were possible. Plausible factors contributing to high levels of variance and the valuable merits of utilizing roommates for reliability checks were discussed.

The Effects of Three Behavioral Treatments on Sleep Difficulties of College Students

by

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CHAPTER I: INTRODUCTION

The heterogeneous clinical entity termed "insomnia" does not merely refer to a single sleep problem but to many behavioral difficulties. An objective description of some of these behavioral dysfunctions are as follows: (a) latency of sleep onset, usually thirty minutes or greater, (b) one or more awakenings during a night's sleep, and (c) latency of sleep onset upon awakening, usually being thirty minutes or greater.

Although the specific incidence of sleep problems in the population is not known, Borkovec and Fowles (1973) found that 18% of an undergraduate psychology class of 650 students felt they had sleep problems which were sufficiently bothersome to seek treatment techniques to eliminate their occurrence.

The research literature attempting to study sleep disturbance has been sparse. Most studies have utilized drugs (McGraw and Oliven, 1959), mainly barbiturates, which although occasionally temporarily effective, have very minimal extratherapeutic generalizations once they are terminated. Similar criticisms also apply when hypnosis (Wolberg, 1954) is used as a treatment of insomnia.

More recently clinicians have conducted research in university settings comparing the efficacy of various treatment techniques by primarily focusing on analogue fears such as snake phobias and the like. Borkovec and Fowles (1973) feel that the study of insomnia is more clinically relevant than these analogue fears for two reasons: (a) a large number of both outpatient and inpatient populations report sleeping disturbances (an estimated 20 million insomniacs in the United States alone), and (b) insomnia as a problem is more likely to disrupt and interfere with daily functioning than are the frequently used analogue fears. It therefore appears that the area of insomnia offers significant research potential and, as such, deserves more scrutiny than it has received.

One of the first studies with insomnia involved a variant of systematic desensitization (Geer and Katkin, 1966) in which a single female subject was treated successfully (in a clinic) using relaxation procedures combined with a single item for visualization since the subject reported an absence of anxiety prior to entering her bed. The single item which the subject visualized was getting into bed, feeling relaxed and falling asleep within a few minutes. In an eight month follow-up, the client reported that on occasion it would take her two - three hours to get to sleep and often this occurred only once every two weeks.

Another study by Evans and Bond (1969), also performed in a clinic, involved a male graduate studuent who received fourteen therapy sessions which utilized systematic desensitization in a single item form identical to that used by Geer and Katkin (1966). For the next eight sessions, he received four conditioning trials with methohexital sodium. Each trial consisted of the subject counting from one to twenty-eight. When the patient began to count, four cubic centimeters of a 5 percent solution of methohexital sodium was injected, and this resulted in sleep when the patient reached twenty-eight. The patient then slept for three to four minutes at which time he was allowed to awaken for a further two minutes, and then the next trial was begun. Methohexital conditioning resulted in an almost normal sleep pattern, a state which the patient had been unable to obtain for almost seven years. Systematic desensitization therapy did not produce any significant change in his sleeping pattern.

The first group design for the therapy of insomnia was by Kahn, Baker, and Weiss (1968), who used 16 subjects who reported a median estimated time to sleep in a pre-measure of 52 minutes. The treatment involved two 39-minute group training sessions per week for two weeks in a relaxation technique called Autogenic training (Schultz and Luthe, 1959) which appeared to be similar to hypnotic relaxation (Paul, 1969). Of the 13 subjects in the post

interview, 11 reported improvement (three very much better; eight some better), while two reported no improvement. Unfortunately, this report lacked a control group which could have demonstrated that the improvements made by the subjects were not merely due to remittance over time. Eisenman (1970) criticized this study for (a) the confounding of the relaxation procedure with Rogerian interviewing, (b) the possibility of demand characteristics influencing the outcome data, and (c) the use of only self-report measures as an improvement index. Although Baker and Kahn (1972) defended the use of their self-report measure adequately, the inclusion of control groups is the only method of alleviating the remaining two criticisms of Eisenman.

Two other studies have investigated insomnia from an attribution formulation: Storms and Nisbett (1970), and Davison, Tsujimoto, and Glaros (1973). Storms and Nisbett used 42 subjects who reported taking 43 minutes, on the average, to get to sleep on the two nights that served as a baseline. All subjects were given placebo pills to take just prior to bedtime. Some subjects were told that the pills would cause arousal, and others were told that the pills would reduce arousal. As predicted, arousal subjects got to sleep more quickly than during baseline, presumably because they attributed their arousal to the pills rather than to their emotions and, as a consequence, were less

emotional. Also, as predicted, relaxation subjects got to sleep less quickly than usual, presumably because they assumed that their emotions were unusually intense since their arousal level was high, even after taking an arousal reducing agent. The use of deception and the reliance on placebo pills, from a practical clinical standpoint, cause this study to have dubious value in contributing to a viable therapeutic procedure for insomnia.

The Davison et al. (1973) study, used essentially a Davison-Valins attribution hypothesis which assumes that behavior changes believed to be due to an external agent, like a drug, generalize less to the post-treatment situation than changes believed to be due to one's own efforts. All subjects were given 1,000 mgs. of chloral hydrate each night and were instructed in self-relaxation procedures developed by Bernard Weitzman (1967) of the New School for Social Research. Following treatment, half of the subjects were informed that they received an optimal dosage, and the balance of the subjects were told that they had received a dosage which was too weak to have produced any changes. Then the subjects were told to discontinue the drug and to merely use self-relaxation during the post treatment week. As predicted, greater maintenance of therapeutic gain was achieved by those who could not attribute their changes to the drug. Two difficulties arise when this study is assessed for its relative clinical

contributions to a treatment for insomnia: (a) the treatment failed to significantly reduce latency to sleep from baseline to post treatment, and (b) drugs were confounded with relaxation procedures, making it difficult to assess the differential contributions of each in the total success of the therapeutic procedures.

A recent study by Weil and Goldfried (1973) on an 11-year-old girl demonstrated that self-relaxation procedures consisting of alternate tensing and relaxing of various muscle groups, combined with instructions to "shut out all external noises and ruminations" could successfully eliminate difficulty experienced in falling asleep at night.

There has been a deficit in all the previously mentioned studies, namely the lack of a concisely controlled investigation which analyzes several unconfounded treatment conditions in a between subject design. Borkovec and Fowles (1973) have recently executed a study which fulfills these prerequisites. Their study incorporated 37 subjects who had an average latency of sleep onset of 44 minutes during baseline. These subjects were then matched on latency of sleep onset and assigned to one of four treatment conditions: (1) progressive relaxation which involved the systematic tensing and relaxing of various muscle groups of the body, with indirect suggestions of relaxation; (2) hypnotic relaxation which involved direct

suggestions of relaxation (see Paul, 1969, for more details); (3) self-relaxation which had subjects practice relaxing themselves by concentrating on neutral imagery and on the resultant feelings of relaxation in the muscles of the body (the authors viewed this as essentially a control condition); and finally (4) a no-treatment control condition. After three one-hour therapy sessions, progressive and hypnotic relaxation groups showed significantly greater improvement than no-treatment, while self-relaxation produced nearly equal improvement to the progressive and hypnotic relaxation conditions. The self-relaxation group did not differ significantly in their improved sleep latencies from the no-treatment control group. Thus, since the two treatment groups did not differ significantly from the placebo control group, the results from these three groups can be interpreted as possibly being due to suggestion, therapist contact, expectations for improvement, and not necessarily the result of the treatment techniques per se. Furthermore, although the self-relaxation group was termed a placebo control condition, it still had the common element of relaxation, which was also found in the two other treatment groups, thus making it appear that a more appropriate placebo group should have been used. Now that the current insomnia research has been presented, a theoretical elaboration dealing with maintenance factors of insomnia will be discussed next.

Two primary theories which could account for the maintenance of insomnia are (a) a muscle tension formulation and (b) a cognitive "mind racing" hypothesis.

The muscle tension formulation was initiated by Jacobson (1938) when he stated that "insomnia is always accompanied by a sense of residual tension," (which refers to a fine, tonic muscular contraction) "and can always be overcome when one successfully ceases to contract these parts." Thus it was postulated that insomnia involved a high level of tension in the gross skeletal muscles. This view has been shared by several researchers (Geer and Katkin, 1966; Kahn et al., 1968; Borkovec and Fowles, 1973; and Weil and Goldfried, 1973) and is evidenced by their utilization of relaxation techniques for the treatment of insomnia. Therefore, the present study incorporated a relaxation training condition which involved subjects' learning to systematically tense and release the various muscle groups in their bodies on the premise that this should significantly reduce the level of muscle tension and thus possibly alleviate insomnia. The relaxation-training condition used in this study closely paralleled the progressive relaxation condition used by Borkovec and Fowles (1973) in their study of insomnia.

The other prominent theory of insomnia is that of "mind racing." This was first mentioned in the study by Geer and Katkin (1966) in which the subject reported that

"after retiring to bed her mind began to race with upsetting thoughts." This is a frequent complaint of subjects in studies of insomnia (Borkovec and Fowles, 1973; Davison et al., 1973) and refers to a cognitive difficulty in turning off visual images and preventing them from recurring. As a result, subjects' thoughts appear to race through their minds presumably uncontrolled. An analogue would be to conceptualize a subject's thought process as being similar to a video tape recorder (VTR). A VTR is usually able to be controlled manually; that is, a switch activates the visual sequence and then terminates it. In their everyday lives, most subjects are able to activate this VTR to conjure up past experiences. The problem arises when the VTR must be deactivated in order to carry on some "life function" (i.e. studying, performing a difficult manual task, etc.). It becomes difficult at times to terminate this visual sequence; sometimes it even appears that the deactivation switch is temporarily disconnected producing "obsessive thoughts." The majority of subjects are not bothered by obsessive thoughts because they find that the VTR is under their control. However, many subjects discover that the process of getting into bed and attempting to sleep is an automatic trip mechanism to switch on the VTR, which then leads them to discover that there is no way to activate the VTR with its continuing visual sequences. At this point insomnia results, because the subject realizes that no matter

how hard he or she tries, this VTR will continue to play, and with lack of control comes the vicious anxiety circle (i.e. I've got to shut this thought off if I'm to get to sleep ... I can't shut it off ... I'm anxious because I can't shut it off and get to sleep ... Now I can't sleep because I'm anxious). Various studies have indirectly designed their treatment procedures toward this theory of insomnia (Borkovec and Fowles, 1973; Davison et al., 1973). In Borkovec and Fowles' study, instructions and training were given in a method of attention focusing, which is incompatible with that of other cognitive activity. However, this training was confounded by being used in all the treatment conditions, which therefore makes any attempt to assess its differential contributions futile. The same confounding occurred in the Davison et al. study in which subjects were asked to perform various mental exercises (i.e., "Is it possible for you to imagine that you are looking at something that is very far away from you?") that would be an equivalent of attention focusing. However, again, all treatment conditions received these same instructions. The relaxation training condition in the present study may also act as a thought control procedure by having subjects focus their attention on the various feelings of tension and relaxation in their muscles. A more direct technique to control cognitive activity is "thought-stopping" which begins by having the client close

his eyes and verbalize a typical sequence of thoughts which are persistently bothersome to the client. During the verbalization the therapist suddenly shouts, "Stop!" and then draws attention to the fact that the thoughts actually do stop. The client repeats this several times and is urged by the therapist to try to interrupt these unadaptive thoughts by saying, "Stop!" subvocally (Wolpe, 1969). Taylor (1963) has also applied thought-stopping to the treatment of compulsive eyebrow-plucking of 31 years' duration. The habit was overcome in ten days. Along these same lines, a treatment condition in the present study was termed self-regulation of thoughts and involved training subjects in the control of the starting and stopping of their thoughts. This was the first systematic attempt in a controlled study to assess not only the differential efficacy of two minimally confounded treatment techniques, but further, to evaluate two possible theories regarding the etiology of insomnia.

A final possible theory regarding the factors underlying insomnia would obviously have to include a combination of the two theories previously mentioned. Thus, it could be postulated that insomnia could be due to generalized muscle tension and increased cognitive activity ("mind racing"). This would seem to be a logical assumption considering the fact that the treatment of choice for most phobias, "systematic desensitization," involves a

relaxation component and a visual imagery component which when combined systematically in a hierarchial form prove to be quite efficacious. Therefore, a treatment condition which essentially is a variant of systematic desensitization, was used in this present study to evaluate the possibility that insomnia was caused by a combination of muscle tension and mind racing. This condition, termed combined treatment (CT), indicates that it was composed of the two other treatment conditions in combination.

A variable which must be taken into consideration in every therapeutic experimental design is that of demand characteristics (Orne, 1962). This refers to subjects having knowledge that they are being treated for insomnia with a certain therapeutic technique and simply responding with the desired report of improvement. Two popular means of controlling for demand characteristics are the use of intentional manipulation of demands and the use of an attention placebo manipulation. A placebo control condition basically involves the fabrication of a therapy technique which is similar in procedure to the active treatment groups, yet does not utilize any demonstrated efficacious therapy techniques but mere pseudo techniques which appear plausible to the clients. This condition is essentially used to control for experimental demand characteristics as well as general factors such as contact with the therapist, coming for appointments, and verbal discourse with an interested

person. In reviewing the studies on insomnia mentioned in this current undertaking, it was found that all the case studies, by their nature, fail to control for this variable (Geer and Katkin, 1966; Evans and Bond, 1969; Weil and Goldfried, 1973). Also in the group designs, Kahn et al. (1968) used only an intentional manipulation of demands which was still inadequate in order to demonstrate conclusive outcome data. Storms and Nisbett (1970) and Davison et al. (1973) both failed to utilize a placebo control condition. The only study that utilized both previously mentioned controls for demand characteristics was by Borkovec and Fowles (1973) in which a self-relaxation condition was included as a placebo control and intentional manipulation of demands was made by informing subjects that the actual purpose of the study was to assess the effects of the technique on reducing physiological arousal. The current study incorporated a placebo control condition in the form of a discussion group which consisted of subjects being informed that discussing one's sleep problems in a group was a viable treatment procedure for insomnia. However, no active therapy was done in this discussion setting and as such it served as a control for therapeutic contact and subtle influence variables. An intentional manipulation of demands was also made by informing all the subjects that they were not to expect any dramatic improvement effects of treatment until the last therapy session,

thus controlling for demand characteristics during the therapeutic sessions.

A no-treatment control group was also used in this current study as a control for improvement over time which could result from many variables such as merely collecting data on the parameters of sleep, being in a therapeutic study, or simply remitting over time due to statistical regression.

Baker and Kahn (1972) in their reply to a critique by Eisenman (1970), state that, "We consider the defining attribute of 'behavioral measure' to be the actual presence of the therapist or his responsible surrogate." This statement refers to the fact that people labeled as insomniacs grossly exaggerate their estimates of the length of time it takes them to fall asleep (Rechtschaffen and Monroe, 1969). Thus, the validity of using self-report measures of sleep onset has been questioned by various investigators (Monroe, 1967; Borkovec and Fowles, 1973). The current study attempted to incorporate a novel feature that would, hopefully, provide a reliability check on the currently used dependent measure of latency of sleep onset. This was accomplished by enlisting the assistance of the roommates of the subjects as responsible surrogates in an attempt to have these roommates also quantify objectively the following aspects: (a) when the subject gets into bed; (b) when the subject presumbably is asleep; (c) if he or

she is aware of the subject awakening at night and if so, how many times; and (d) when the subject arises in the morning. No other study in the literature has attempted to utilize such a reliability check on their dependent measures; and if such a procedure should prove to be viable, it will give the clinical researchers in this area objective dependent measures of sleep performances which are reliable.

CHAPTER II: METHOD

Experimental Design

The study involved 60 undergraduates who reported difficulty getting to sleep. They were systematically matched into five groups: (1) relaxation training (RT); (2) self-regulation of thoughts (ST); (3) combined treatment (CT); (4) no-treatment control (NC); and (5) discussion group control (DC). Five dependent measures were taken by the subjects and their roommates.

Subjects

Most subjects were selected from a large group enrolled in an introductory psychology course at The University of North Carolina at Greensboro. Subjects from the introductory psychology class received experimental credit, which is a course requirement, for their participation in the experiment. Subjects were also recruited from ads which were placed on campus bulletin boards and in the school newspaper, asking for people who take an hour or longer to get to sleep and desire help. Additional subjects were solicited from a physical education class and a nursing class.

Approximately 700 students were given a general screening questionnaire (See Appendix A) which asked to

rate their various fears (i.e., regarding snakes, rats, high places, etc.) on a scale from none to very much fear (Wolpe, 1969). The question regarding insomnia was integrated with these other stimuli in order to eliminate demand characteristics and acquiescent responding. Based on the subjects' answers to question number five on the screening form, 60 undergraduates, 50 females and 10 males, were selected to participate in the study.

Treatment Groups

Relaxation Training (RT). This treatment technique consisted of a tape recording of relaxation training made by the experimenter, following specific direction of Wolpe (1969). All subjects were told at the beginning of the first session that a prominent theory of insomnia is that muscle tension in the major muscles of our body causes tension and anxiety, which prohibits sleep. Furthermore, the subjects were told that many famous clinical studies have found that the most effective technique to remove these muscular tensions is relaxation training. Relaxation Training was described as the systematic tensing and releasing of the various muscles in our bodies. The taped procedure was then begun. Subjects were told that this technique would prove most effective in helping them go to sleep at night with very little delay.

Self-Regulation of Thoughts (ST). All subjects at the beginning of the first session were given the follow introductory explanation regarding mind racing and how it relates to insomnia:

> A prominent theory of insomnia is that when a person gets into bed, his mind begins to race, and he begins to visualize various sequences from during the day or his past life or the future. Furthermore, most people find that they cannot control these visual images and get anxious when they don't stop. Thus, these people who find they have no control over their thoughts at bedtime remain awake. However, many famous clinical studies have found that the most effective technique to stop this mind racing is Self-Regulation of Thoughts. Self-Regulation of Thoughts involves training people how to control their thoughts by learning how to stop and start their thoughts. Thus, through practice a person will find that he will be able to control whether he thinks of something or not, and how to stop thinking of it if he does. This should prove most effective in helping him to go to sleep at night with very little delay.

The subjects were asked to write down three topics which they currently and most frequently visualized while attempting to fall asleep (i.e., worry about a test, boyfriend, etc.). Then they were asked to rank order them from least to most frequent and bothersome. Next they were instructed to start visually imagining the first topic. When they reported that it was clear, they were then questioned by the examiner regarding all the details in the image (to be sure that they adequately visualized it). Then they were asked to stop visualizing the scene and to signal when they had stopped imagining it. They were then instructed to clear their minds and to think of

nothing at all. Each scene (topic) was visualized and stopped and repeated for approximately ten minutes.

Combined Treatment (CT). At the beginning of the first session each group received this introductory rationale and explanation of these procedures:

> A prominent theory of insomnia is that when a person gets into bed, he experiences muscle tension in all the major muscles in his body, and combined with this, his mind races which means that he begins to visualize various events or people and has no control over starting or stopping these visual sequences. Thus, this muscle tension causes people to feel anxious and tense, thereby inhibiting sleep. Furthermore, the mind racing also causes a person to feel tense or anxious and together these two phenomena cause insomnia. However, many famous clinical studies have found that the most effective technique to alleviate muscle tension and to stop mind racing is Combined Treatment (CT), which has two main features. First, the therapist will train the client to relax the various muscles in his body. Second, the therapist will combine another procedure with this which involves the client learning how to start thinking of something and then learning how to stop thinking about it. Thus with practice the client will learn how to relax all of his body and control his thoughts which should prove most effective in helping him to go to sleep at night with very little delay.

The therapy sessions consisted of a 15-minute relaxation tape which was a condensed version of the tape used in Relaxation Training and the subjects also had to write down similar topics as the three described in ST. After the subjects had written down the three topics, they were asked to visualize and then stop visualizing each of the topics repeatedly for approximately five minutes.

Discussion Group Control (DC). After the initial rationale of the discussion theory was presented during the first session, the subjects in this condition merely discussed only problems and not solutions relating to insomnia and related areas with the therapists and other subjects. A brief outline of the topics which could be discussed in each session is as follows:

a. Personal description of each person's sleep problems
b. Past history of sleep problem
c. Father's and mother's sleep patterns
d. Sleep patterns of siblings
e. Early childhood sleep patterns
f. Descriptions of past sleeping environments
g. Early folklore regarding sleep
h. Current studies on sleep dealing with REM and NREM periods specifically
i. Freudian explanations of sleep
j. Inherited aspects of sleep problems

This treatment condition, although conducted in a group, was not group therapy because no directive action was taken by the therapists to guide or control the nature of the discussion. The topics were merely brought up by the therapists and then the subjects were asked to give their comments on the topics.

No-Treatment Control (NC). These subjects were merely told that four weeks of baseline data was needed prior to starting treatment. Subsequently, for ethical reasons, they were given four sessions of the combined treatment procedure after the follow-up period.

Dependent Measures

Data Taken by Subjects. All subjects were asked to fill out a data sheet (Appendix B) every morning during the four weeks of the study: one week of baseline, two weeks of treatment, and one week of follow-up. The questions on the daily data sheet asked for the time the subject got in bed, time he fell asleep, how many times he awoke, at what time he awoke in the morning, feeling of restedness (1 - 5 scale), and satisfaction with night's sleep (1 - 5 scale). Thus, the four dependent measures which were used in this study were: latency to sleep onset, difficulty getting to sleep, number of awakenings and degree of restedness. The subjects were asked to turn in their baseline data at the first treatment session, along with their roommate's data which was in a sealed envelope. The subjects were also told that his or her roommate would be asked to help in the study and that he or she should not ask their roommates the nature of the task that they were performing. After each subsequent week of data collection was completed, it was deposited by the subjects in a box put out in front of the house where therapy was held.

Data Taken by Roommates. The unique feature of this study was the attempt to utilize a reliability check on the four previously mentioned dependent measures. This was

attempted by having a minimum of three subjects from each condition who had roommates take with them a sealed envelope to their roommates. A minimum of three roommates taking reliabilities per group was set so as to have enough data points to analyze the results. This envelope contained a data sheet and an explanation which briefly asked for his or her cooperation in writing down (on two days during baseline, treatment, and follow-up weeks) the time the subject got into bed and the time the subject was asleep (See Appendix C). Roommates were instructed to determine if the subjects were asleep by four criteria: (a) eyes closed, (b) no movements for five minutes; (c) breathing deeper than normal waking state; and (d) most important, when the roommate observed the subject's previous criteria, he or she was to whisper very softly, "Are you asleep?" (No response, of course, if the subject were asleep.) Also, the roommate was to record whether he was aware of subject awakening during the night, how many times he or she awakened, and when the subject woke up. The roommate was also told to be confidential about his data-keeping and not to consult with the subject. Each roommate was contacted by telephone on the first night that the subject returned with the envelope for his or her roommate. The roommates were asked if they would cooperate, and any questions that they had were answered at that time. The roommates were also asked to perform reliability checks on the dependent

measures for any eight days over the four weeks of the study; just as long as two days were during baseline week, and four days were during the treatment weeks (two days during each week) and two days were during baseline. The roommates were also told to put their completed weekly data in a sealed envelope which they were to give to the subject who would bring it in when he or she came to the therapy sessions.

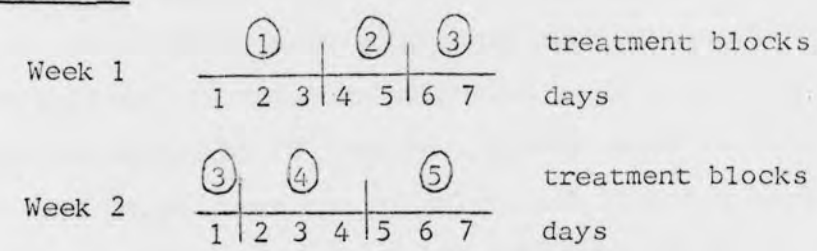
Procedure

All subjects who came for their initial interview were given a detailed questionnaire (See Appendix D) regarding their sleep behavior, history of their disturbance, current life situation, and past and current treatment for the disturbance, if any. Each subject was then asked the name of his roommate and to what degree the subject believed his roommate would cooperate in reliability data checks.

Subjects who said their roommates would cooperate were given an envelope for them which contained forms for reliability observations. At this time subjects were also given an envelope which contained 28 daily sleep forms and instructions regarding when these forms were to be filled out. Based on the subjects' answers to question five on the above questionnaire they were assigned by matching their latencies of sleep onset so that they formed five evenly matched treatment groups with twelve subjects in

each. Each subject from the treatment conditions was contacted by telephone and asked to sign up for four treatment sessions from five blocks of time over the following two weeks. Each subject was informed that therapy sessions would be conducted on each of the 14 days. Also, each subject was told that he must choose four days with each day falling in a different therapy block so that four of the available five blocks were selected by the subject. This procedure was used because the random assignment of therapists to treatment groups could be more effectively planned than with the usual regular appointment procedure. For further elaboration, see the diagram below:

Treatment



The treatment sessions were conducted in a group manner with two to six subjects per group session because the variable schedules of the subjects made it infeasible to conduct treatment sessions with a fixed number of subjects each time.

The training experience of the two therapists [Thomas P. Tokarz (TPT), who was a second year clinical graduate student and Pam Griffin (PG) who was a senior

undergraduate psychology major7 consisted of six to eight hours of role playing the various treatment procedures with PG and Dr. Scott Lawrence. The role playing was done in a "microteaching format," where one of the three members would model the client (i.e., TPT), and another would model the therapist (i.e., PG), while the third member observed (i.e., Dr. Scott Lawrence) and gave feedback concerning the behaviors of the two models. Then the roles were rotated to allow members different opportunities to observe, and/or to role play. Furthermore, written therapy instructions for each treatment group were followed by both therapists in order to provide maximum standardization. The two therapists (TPT and PG) randomly conducted the various treatment sessions, so that each treatment group had half of its sessions conducted by TPT, and the other half conducted by PG, but in a random order (i.e., the first and fourth sessions of Relaxation Training were done by TPT and the second and third were done by PG). This randomization was done to eliminate any bias effects of one therapist or the sex of the therapist.

The first therapy session for each treatment group was 45 minutes. The initial 15 minutes of these first sessions was devoted to presentation of the treatment rationale, treatment procedure description, and explanation. The remaining 30 minutes of these first sessions was concerned with the actual performance of the various

specific treatment procedures. The following second, third, and fourth treatment sessions for all the groups were 30 minutes in length. The entire 30 minutes of these subsequent treatment sessions was devoted to the actual performance of the various specific treatment techniques. At the end of each therapy session subjects were asked to practice the specific therapy technique which they had learned during that session for ten minutes twice a day (the last time just before going to sleep), and to indicate on a reminder check list how often they practiced each day (see Appendix E).

Follow-up was held five weeks after the last week of treatment sessions and involved all subjects filling out one final week of daily sleep forms and then returning these forms when they were completed.

CHAPTER III: RESULTS

During the course of the study eight students elected not to continue the experiment, and two subjects were randomly dropped in order to have an equal number of subjects in each treatment group for the execution of a multivariate ANOVA, leaving ten subjects per group.

Subject-Roommate Reliability Data

The reliability measures in Table I (time to bed, time to sleep, time up, amount of sleep, latency to sleep onset, and number of awakenings) are reported for each experimental group and averaged across all phases of the study. Overall 70% of the reliability coefficients in Table I are significant at $p < .001$. A 5x6 (5 treatments x 6 sleep measures, i.e., time to bed, time to sleep, see above) ANOVA was performed to evaluate the possibility that certain treatment groups and/or that certain sleep related measures might have more significant reliabilities than others when averaged across all phases of the study.

As shown in Table II, the sleep variable main effect was found to be significant at the .001 level, ($F = 7.38$; $df = 5,20$) indicating that there were significant differences between the various sleep measures.

TABLE 1

Reliability Correlation Coefficients of Roommate with Subject Reports as a Function of the Five Treatment Groups for the Entire Study

Treatment Group	Time to Bed	Time to Sleep	Time Up	Amount of Sleep	Latency to Sleep Onset	Time Awakened
Relaxation Training	.86*** n=36	.87*** n=36	.94*** n=36	.26 n=36	.70*** n=36	.03 n=36
Self-Regulation of Thought	.82*** n=60	.81*** n=60	.70*** n=60	.07 n=60	.21 n=60	.16 n=60
Combined Treatment	.92*** n=30	.76*** n=30	.65*** n=30	.19 n=30	.88*** n=30	.61*** n=30
Discussion Group Control	.80*** n=31	.84*** n=31	.77*** n=31	.35 n=31	62*** n=31	.23 n=31
No-Treatment Control	.91*** n=58	.89*** n=58	.09 n=58	-.12 n=58	.26 n=58	.75*** n=58
Total	.89*** n=215	.85*** n=215	.48*** n=215	.0925 n=215	58*** n=215	42*** n=215

*** = $p < .001$

TABLE II

5x6 ANOVA on the Pearson Reliability Coefficients as a Function of the 5 Treatment Groups and 6 Sleep Variables

Source	df	MS	F
Treatments	4	.05	.98
Sleep Variables	5	.38	7.38***
Error	20	.05	

*** = p .001

A Newman-Keuls post hoc test revealed that the reliabilities for the dependent measure, amount of sleep, were significantly lower ($p < .01$) than those for time to bed, time to sleep, and time up across all treatments.

Table III illustrates the reliabilities for the various phases of the study. The majority of the reliabilities throughout the three phases are significant. A 6x3 (6 sleep measures, i.e., time to bed, time to sleep, see above, x 3 phases, baseline, treatment, and follow-up) ANOVA was performed to evaluate if there were any significant changes in reliabilities between phases or the sleep measures.

Table IV illustrates that the two main effects, sleep variables and phases, were significant at the .001 and .01 levels respectively, ($F=16.40$; $df=5,10$, and $F=7.61$; $df=2,10$). Newman Keuls post hoc tests revealed first, that the treatment phase had significantly lower ($p < .05$) reliabilities than the follow-up phase. Secondly, the dependent measure, amount of sleep, was significantly less reliable across all phases of the study than the reliability for: time to bed, time asleep, and time up in the morning. Also, the reliabilities for the dependent measure, latency to sleep onset, were significantly lower ($p < .01$) across all phases of the study than for time to bed.

Correlations were performed in order to measure the degree to which reported latency to sleep onset was related to subjective difficulty of getting to sleep. More

TABLE III

Pearson Reliability Correlation Coefficients of Roommate with Subject Reports as a Function of the Three Phases of the Experiment: Baseline Treatment and Follow-Up for All Treatment Groups

	Baseline	Treatment	Follow-Up
Time in Bed	.88*** n=52	.84*** n=107	.97*** n=56
Time Asleep	.84*** n=52	.79*** n=107	.97*** n=56
Time up in Morning	.67*** n=52	.37*** n=107	.84*** n=56
Amount of Sleep	-.12 n=52	.05 n=107	.28 n=56
Latency to Sleep Onset	.74*** n=52	.33*** n=107	.60*** n=56
Number of Times Awakened	.49*** n=52	.14*** n=107	.63*** n=56

*** = $p < .001$

TABLE IV

6x3 ANOVA on The Pearson Reliability Coefficients as a Function of the 6 Sleep Variables and 3 Experimental Phases

Source	df	MS	F
Sleep Variables	5	.28	16.40***
Phases	2	.13	7.61**
Error	10	.02	

** = $p < .01$
*** = $p < .001$

specifically, did subjects who reported large latencies to sleep onset (i.e., 60 minutes) also report "very much difficulty" getting to sleep? The correlations were as follows: latency at baseline and subjective difficulty getting to sleep at baseline = .67, latency at treatment and difficulty getting to sleep at treatment = .73, and latency at follow-up and difficulty getting to sleep at follow-up = .62. All correlations were significant at $p < .001$ and thus revealed a fairly strong relationship between objective reports of latency to sleep onset and subjective reports of difficulty getting to sleep.

Analysis of Treatment Effects

Scores for each subject on all sleep variables were obtained by computing weekly means from The Daily Sleep Questionnaires (DSQ) completed each day during the baseline, treatment, and follow-up weeks. Weekly means were used rather than individual daily scores because of the high within subject variability of sleep times.

Table V presents the group latency to sleep onset means for the three phases of the study (baseline, treatment, and follow-up) along with their respective standard deviations (SD). Through inspection of Table V, a consistent uniform reduction across all treatment groups from baseline to follow-up can be seen.

TABLE V

Average Sleep Onset in Minutes for the Five Treatment Conditions During Baseline, Treatment, and Follow-Up

Groups	Baseline		Treatment		Follow-Up	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Relaxation Training	39	17	34	16	23	12
Self-Regulation of Thoughts	35	19	29	15	18	13
Combined Treatment	44	15	34	12	29	19
Discussion Group Control	48	21	38	19	28	19
No-Treatment Control	38	18	36	19	33	19

A 3x5 (3 phases x 5 treatments) multivariate ANOVA using four dependent measures (latency to sleep onset, difficulty getting to sleep, number of awakenings, and degree of restedness) was conducted. As indicated in Table VI, the treatment and phase main effects were significant at the .01 level (respectively, $\underline{F} = 2.71$; $\underline{df} = 16,403$; and $\underline{F} = 6.33$; $\underline{df} = 8,264$).

These results indicate that first there are significant differences between the various treatment groups in regards to some combination of the above four dependent measures over the entire study; and, secondly, that there are significant differences in regards to some combination of these four dependent measures between various phases of the study (baseline, treatment and follow-up) over all treatment groups.

In order to assess more specifically where these significant differences in the above multivariate ANOVA were located, four 3x5 (3 phases x 5 treatments) univariate ANOVAs were performed. Each 3x5 ANOVA utilized one of the four dependent measures previously mentioned; latency to sleep onset, difficulty getting to sleep, number of awakenings, and degree of restedness.

The first 3x5 ANOVA which assessed latency to sleep onset and which is presented in Table VII, resulted in a significant phase main effect.

TABLE VI

Multivariate Analysis of Variance on the Four Dependent Variables: Latency to Sleep Onset, Degree of Restedness, Number of Times Awakened, and Difficulty Getting to Sleep

Source	Logized (General Variance)	U-Statistic	df	Approximate F	df
Treatments	20.82	.73	4,4,135	2.71**	16,403.9
Phases	20.86	.70	4,2,135	6.33**	8,264.0
Treatment x Phases	20.65	.87	4,8,135	.56	32,488.4

** = $p < .01$

TABLE VII

3x5 ANOVA for Latency to Sleep Onset

Source	df	MS	F
Treatment	4	489	1.7
Phases	2	2905	10.4**
Treatment x Phases	8	112	.40
Error	135	280.21	

** = $p < .01$

These results indicated that there was a significant reduction at the .01 level, (F = 10.37; df = 2,135) in latency to sleep onset across all treatment groups between the various phases. Newman-Keuls post hoc tests indicated that latency to sleep onset at follow-up was significantly lower than at baseline across all treatment groups.

The second 3x5 ANOVA summarized in Table VIII assessed the dependent measure of reported difficulty getting to sleep and found both treatment and phase main effects to be significant at the .05 and .01 levels respectively (F = 2.99; df = 4,135; and F = 16.03; df = 2,135).

These results indicated that there were significant reductions in the reported difficulty getting to sleep between the various treatment groups across all phases of the study and between the various phases across all treatment groups in the study. Newman-Keuls post hoc tests indicated that the RT subjects reported significantly less difficulty getting to sleep than subjects in the GD treatment condition ($p < .05$) and the subjects in the NC condition ($p < .01$) across all phases of the study. Further post hoc tests also indicated that subjects in the RT condition and the CT condition reported significantly less ($p < .05$) difficulty in getting to sleep than subjects in the NC condition across all phases of the study.

TABLE VIII

3x5 ANOVA for Difficulty Falling Asleep

Source	df	MS	F
Treatment	4	1.08	2.98*
Phases	2	5.84	16.03**
Treatment x Phases	8	.41	1.14
Error	135	.36	

* = $p < .05$

** = $p < .01$

Newman-Keuls post hoc tests conducted on the phases indicated that the subjects in all five treatment groups reported less difficulty getting to sleep during the follow-up and/or treatment phases than during the baseline phase.

The third 3x5 ANOVA summarized in Table IX assessed the dependent measure, number of times awake during the night, and found a significant phase main effect at the .01 level ($F = 6.84$; $df = 2,135$).

These results indicate that the subjects in all five treatment groups reported significant reductions in the number of times awake between the various phases. A Newman-Keuls post hoc test performed on the phases indicated that subjects in all five treatment groups reported a significantly reduced ($p < .05$) number of awakenings during follow-up phase as opposed to either baseline or treatment phases.

As presented in Table X, the fourth 3x5 ANOVA evaluated the dependent measure, degree of restedness upon awakening to the morning, and found a significant treatment and phase main effect at the .01 level (respectively, $F = 7.50$; $df = 4,135$, and $F = 9.13$; $df = 2,135$).

These results indicate that there are significant differences between the treatment groups as to the degree of restedness which they reported upon awakening across all phases of the study and that subjects in all five treatment groups reported significantly different degree of restedness

TABLE IX

3x5 ANOVA for Number of Times Awakened

Source	df	MS	F
Treatment	4	.29	1.18
Phases	2	1.69	6.84**
Treatment x Phases	8	.04	.15
Error	135	.25	

** = $p < .01$

TABLE X

3x5 ANOVA for Restedness

Source	df	MS	F
Treatment	4	1.69	7.50**
Phases	2	2.05	9.13**
Treatment x Phases	8	.18	.79
Error	135	.23	

** = $p < .01$

during different phases of the study. Newman-Keuls post hoc tests reveal that subjects of RT, CT, and ST conditions all reported significantly greater degrees of restedness upon awakening than subjects in the NC group across all phases of the study. Further post hoc tests reveal that subjects in all five treatment groups reported significantly greater degrees of restedness during the follow-up phase than during either baseline or treatment phases.

Four 2x5 (2 phases, treatment and follow-up, x 5 treatments) covariate analyses with the baseline phase held constant and used as a covariate were also performed utilizing the same four dependent measures as in the above 3x5 ANOVAs. The function of these analyses was to assess treatment and phase effects by equating each dependent measure across all treatments at baseline, thereby controlling for possible differences in dependent measures between treatments at baseline. Another reason for these analyses was that the groups were initially matched only for latency to sleep onset and thus the other dependent measures could have been unequal across treatment groups at baseline.

The first 2x5 covariate analysis presented in Table XI using latency to sleep onset as a dependent measure resulted in a significant phase main effect at the .01 level ($\underline{F} = 9.92$; $\underline{df} = 1,89$). Since the baseline was held

TABLE XI

2x5 Analysis of Covariance for the Dependent Variable Latency to Sleep Onset

Source	df	MS	F
Treatment	4	265.	1.53
Phases	1	1,596.	9.22**
Treatment x Phases	4	55.	.32
Error	89	173.	

** = $p < .01$

constant in these analyses, only 2 phases were evaluated in this covariate analysis. Thus, the results indicate that all subjects from the five treatment groups reported significantly greater reductions in latency to sleep onset during the follow-up phase as opposed to the treatment phase.

As summarized in Table XII, the second 2x5 covariate analysis using difficulty in getting to sleep as a dependent measure resulted in both a significant treatment and phase main effect at the .01 level (respectively, $\underline{F}$ = 3.78; $\underline{df}$ = 4,89; and $\underline{F}$ = 15.33; $\underline{df}$ = 1,89).

Newman Keuls post hoc tests revealed that those subjects in the RT group reported significantly less difficulty in getting to sleep than those subjects in the NC group across all phases of the study. Further post hoc tests revealed that all subjects in the five treatment groups reported significantly less difficulty getting to sleep during the follow-up phase as opposed to the treatment phase.

The third 2x5 covariate analysis, which is presented in Table XIII using number of times awakened during the night as a dependent measure, resulted in a significant phase main effect at the .01 level ($\underline{F}$ = 14.40; $\underline{df}$ = 1,89).

These results indicate that subjects in all five treatments reported a significantly less number of awakenings during the follow-up phase as opposed to the treatment phase.

TABLE XII

2x5 Analysis of Covariance for the Dependent Variable Difficulty Getting to Sleep

Source	df	MS	F
Treatment	4	1.17	3.78**
Phases	1	4.75	15.33**
Treatment x Phases	4	.36	1.17
Error	89	.31	

** = $p < .01$

TABLE XIII

2x5 Analysis of Covariance for the Dependent Variable Number of Times Awakened

Source	df	MS	F
Treatment	4	.19	1.10
Phases	1	2.53	14.40**
Treatment x Phases	4	.00	.01
Error	89	.18	

** = $p < .01$

The fourth 2x5 covariate analysis, as summarized in Table XIV, using degree of restedness as a dependent measure resulted in a significant phase main effect at the .01 level (F = 16.75; df = 1,86), and a significant treatment main effect at the .05 level (F = 3.51; df = 4,89).

These results indicate that subjects in all five treatments reported a significantly greater degree of restedness during the follow-up phase as opposed to the treatment phase. Newman-Keuls post hoc tests reveal that subjects of RT, CT and ST conditions all reported significantly greater degrees of restedness upon awakening than subjects in the NC group across all phases of the study.

Table XV demonstrates the amount of improvement in latency to sleep onset between baseline and follow-up as a function of the baseline sleep latency. This enables an assessment of the number of subjects who fall into each category of sleep latencies and their relative improvement as a function of their baseline sleep latency and the treatment received. In general, the largest measure of improvement in latency to sleep onset occurred in those categories which had the highest initial latencies to sleep onset. The mean change score across groups for latency 55-65 minutes was 27.8, whereas, mean change score across groups for latency 45-55 minutes was 25.4. This is

TABLE XIV

2x5 Analysis of Covariance for the Dependent Variable Degree of Restedness

Source	df	MS	F
Treatment	4	.52	3.51*
Phases	1	2.50	16.75**
Treatment x Phases	4	.24	1.65
Error	89	.15	

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

TABLE XV

Analysis of Average Sleep Onset by Categories and by Improvement from Baseline to Follow-Up

	Average Latency to Sleep Onset in Minutes											
	0-15			16-25			26-35			36-45		
Group	N	Latency Change	SD	N	Latency Change	SD	N	Latency Change	SD	N	Latency Change	SD
Relaxation Training	2	-6.2*	12.9	0	0	0	1	14.7	0	3	12.1	13
Self-Regulation of Thoughts	1	3.9	0	2	9.4	1.7	3	15.3	3.9	2	20	2.5
Combined Treatment	0	0	0	1	-1.1*	0	0	0	0	5	16	9.1
Discussion Group Control	1	1.7	0	0	0	0	1	14	0	3	-8.4*	23
No-Treatment Control	1	-7.4*	0	0	0	0	3	13	4.4	4	1.5	16
Total	5	-2.8	8.3	3	5.9	6.2	8	14.3	3.3	17	8.1	16.1

* Indicates an increase in average latency to sleep onset from baseline to follow-up.

TABLE XV

(Continued)

Average Latency to Sleep Onset in Minutes

Group	46-55			56-65			65+			Total		
	N	Latency Change	SD	N	Latency Change	SD	N	Latency Change	SD	N	Latency Change	SD
Relaxation Training	2	20	23	2	43	1.1	0	0	0	10	16.4	20
Self-Regulation of Thoughts	1	37	0	0	0	0	1	25.2	0	10	17.1	9.5
Combined Treatment	2	27	11.5	1	20	0	1	-4.9*	0	10	14.9	12.7
Discussion Group Control	2	23	13	1	41	0	2	60.7	2.5	10	20	29
No-Treatment Control	1	25	0	1	-6.9*	0	0	0	0	10	5.6	13.9
Total	8	25.4	12.2	5	28	21.7	4	35.4	31.7	50	14.8	18.4

* Indicates an increase in average latency to sleep onset from baseline to follow-up.

reasonable because it is easier to bring about a reduction in numerically larger latencies (i.e., 60 minutes) in the form of baseline measures, than in the case of numerically smaller latencies (i.e., 30 minutes). More specifically, the larger latencies offer a larger distance for reduction than the smaller latencies..

Following this line of reasoning, it seemed plausible that the lack of a significant ANOVA for latencies to sleep onset might possibly be due to the fact that a fair number of subjects had latencies of 35 minutes or less. Therefore, since these smaller latencies had a limited distance that they could be lowered, (i.e., 35 minutes $\longrightarrow$ 0 minutes = 35 minute possible reduction versus 60 minutes $\longrightarrow$ 0 = 60 minute possible reduction), a "basement effect," was operative. This meant that due to these fixed possible reduction capacities, it was made more difficult to achieve a significant reduction from baseline to follow-up for the subjects with smaller latencies.

Thus, a percent of improvement analysis for latencies was done in the form of an ANOVA. This statistic involved computing a percent of improvement in latency to sleep onset for each subject based on the initial baseline latency and the percent which it decreased relative to that latency at follow-up. This analysis controlled for the above-mentioned problem by having each

measure of improvement in latency be based on a percent change rather than on an absolute numerical change which is dependent upon the size of the initial baseline measure. Although the hypothesis for the performance of this statistical test would maximize small changes from a low baseline and minimize large changes from a high baseline, thereby "stacking the cards against getting a significant difference," it was, however, utilized under the premise that the above-mentioned "basement effects" might tend to wash out any reductions in the lower initial latencies, while maximizing the chances that higher initial latencies would show larger reductions. Thus it was postulated that an analysis of the data based on percentage of latency reduction would possibly tend to make the small changes in the initially lower latencies more apparent and therefore maximize the overall possibility of significant results, since 32 subjects had initial latencies of 45 minutes and below, whereas, only 17 subjects had initial latencies of 46 minutes and above. The results of Table XVI, however, fail to indicate any significant main effects or interactions.

An Analysis of Variance on the Difference Between Whether or Not Reliability Was Taken

Another plausible hypothesis for the lack of significance could have been an observer reactance (Webb,

TABLE XVI

Simple One-Way ANOVA for Percentage of Improvement in Latency to Sleep Onset for All Treatment Subjects from Baseline to Follow-Up

Source	df	MS	F
Treatment	4	.169	.88
Error	45	.190	

Campbell, Schwartz and Sechrest, 1970) which means that for some reason those subjects who had roommates performing reliability measures on the subjects' sleep patterns might have reported their sleep times more conservatively than those subjects who had no roommates performing reliability checks. Thus, since more than 60% of the subjects had reliability observations performed on them, it seemed possible that this large number of subjects reporting more conservative sleep times could significantly reduce the actual latencies which were occurring. An ANOVA was performed to assess the reductions in latency to sleep onset as a function of having reliability checks taken or not from baseline to follow-up.

As can be seen in Table XVIII, no significant effects were present as a function of whether or not reliability checks were taken.

However, another aspect of the reliability measures could have been that the subjects who had roommates performing reliabilities on the subjects' sleep patterns might have reported their sleep times more consistently or with less variability than those subjects who did not have roommates performing reliability checks. Thus it seemed possible that those subjects who had reliabilities being taken on their sleep pattern could produce reports of sleep times which had less variability and thus were more likely to produce significant results than those

TABLE XVII

Analysis of Average Latency of Sleep Onset as a Function of Roommate Reliability Being Taken or Not Taken from Baseline to Follow-Up

Groups	Reliability Taken			Reliability Not Taken			Totals		
	N	Latency Change	SD	N	Latency Change	SD	N	Latency Change	SD
Relaxation Training	6	13	20	4	21.6	21.4	10	16.4	19.8
Self-Regulation of Thoughts	5	19	5	5	15.6	13	10	17.1	9.5
Combined Treatment	9	17	11	1	-4.9*	0	10	14.9	12.7
Discussion Group Control	6	28	28	4	13.9	39.7	10	22.2	32
No-Treatment Control	8	5	13	2	8.3	21.5	10	5.6	14
Total	34	15.6	17.7	16	14.5	22.95	50	15.2	19.3

* Indicates an increase in average latency to sleep onset from baseline to follow-up.

TABLE XVIII

Analysis of Variance for Roommate Reliability Taken or Not Taken from Baseline to Follow-Up

Source	df	MS	F
Column (Reliability Taken or Not)	4	307.7	.78
Rows (Treatments)	1	243.2	.62
Rows x Columns	4	262.4	.67
Error	40	391.1	

reported subjects without reliability checkers. Therefore, the total variances of the subjects who had reliabilities taken were compared with those variances of subjects without reliability checkers while correcting for the small and unequal numbers of subjects in each group.

Through inspection of Table XIX it is apparent that only the subjects in the ST treatment group who had reliabilities taken produced significantly less ($p < .05$) variable reports of sleep tiems than those subjects in that group who did not have reliabilities taken ($F = 6.76$; $df = 4,4$).

TABLE XIX

A Simple F Test to Assess the Difference in Variances Between Reliability Being Taken or Not Being Taken

Treatments	Reliability (r) Being Taken			Reliability (wr) Not Being Taken			$F = \frac{S^2_{wr}}{S^2_r}$	df	sign.
	n	S^2	df	n	S^2	df			
Relaxation Training	6	400	5	4	458	3	1.15	3,5	N.S.
Self-Regulation of Thoughts	3	25	4	3	169	4	6.76	4,4	*
Combined Treatment	Could not do because n too small (i.e., df would = 0)								
Discussion Group Control	6	784	5	4	1576	3	2.01	3,5	N.S.
No-Treatment Control	8	169	7	2	462	1	2.74	1,7	N.S.
Total	34	313	33	16	527	15	1.68	15,33	N.S.

* = $p < .05$

CHAPTER IV: DISCUSSION

In the current investigation there was no therapy condition which was found to be significantly more effective than any other therapy condition from baseline to follow-up in the treatment of insomnia based on the analysis of the four dependent measures.

Since the four 2x5 covariate analyses were more controlled evaluations of the treatment and phase effects than the 3x5 ANOVAs, the results from the 2x5 covariates will be utilized in this discussion as the final valid indicant of therapeutic success. The results of the two types of analyses indicated that the same main effects were found to be significant in both analyses, however, there were slight differences (i.e., 2x5 covariate analyses for restedness, treatment effect - $p < .05$; 3x5 ANOVA for restedness, treatment effect - $p < .01$) in the levels at which the main effects were found to be significant. The 3x5 ANOVAs will be used to assess the various phase effects due to the fact that during the covariate analyses, baseline was held constant; and, therefore, only the differences between treatment and follow-up could be assessed.

There was a significant reduction in latency to sleep onset across all five treatment groups between

baseline and follow-up and also between treatment and follow-up. This indicates that all treatment groups uniformly decreased their latency to sleep onset from the baseline and/or treatment phase to follow-up phase. The possible reasons for this reduction are entirely speculative and could be due to several factors: the subjects' knowing they were all in a sleep experiment which was supposed to help their insomnia, and via demand characteristics they improved; the fact that all subjects had to fill out DSQs, which might have caused them to monitor their sleep patterns more closely and thereby bring about improvement; some extra-experimental concomittant variable which influenced all groups equally; and finally, that subjects in this study possibly were not actual insomniacs and thus only had minor sleep problems which remitted over time.

In relation to another dependent measure, reported subjective difficulty getting to sleep, a significantly greater reduction was reported by subjects in the RT group than the NC subjects across all phases of the study. Thus, although subjects in RT claimed to have less difficulty getting to sleep across all phases than did NC, the RT subjects still did not report that their latencies to sleep onset were decreasing significantly more than subjects in any other group. In this case, then, for some reason, the RT subjects at least believe that it is easier

for them to get to sleep than the NC subjects. One possible reason could be the elaborate nature of the instructions for RT, which focused heavily on numerous suggestions regarding the various states of the muscles. Thus, maybe because the subjects were given something specific to do, it did not seem to take them as long to fall asleep. Another aspect still related to this dependent measure was that subjects in all treatment conditions uniformly reported a significantly greater reduction in difficulty getting to sleep during follow-up than during baseline or treatment. Again the most plausible reasons for this reduction would be those previously raised in relation to the reduction of latency to sleep onset. Another dependent measure, number of times awakened during the night, was found in all treatment conditions to be significantly reduced during follow-up as compared to baseline and/or treatment. The possible reasons for this again would be similar to those mentioned for latency to sleep onset. The final dependent measure, degree of restedness upon awakening, was found in all treatment conditions to be significantly increased during follow-up as compared to baseline and/or treatment. The possible reason for this result would be as mentioned previously in relation to latency of sleep onset. Furthermore the subjects in RT, CT, and ST conditions all reported significantly greater degrees of restedness

upon awakening than subjects in the NC group across all phases of the study. The possible reason for this would be that these three groups were the active treatment groups as opposed to GD which was a placebo. Thus, subjects in these three groups at least thought that they were more rested upon awakening.

Two hypotheses, mind racing and muscle tension which concerned the maintenance of insomnia, were evaluated in this study. However, due to the lack of any significant interactions between the treatment and phase variables, no definite conclusions concerning these hypotheses are possible. It should be made clear that the lack of significant treatment by phases interactions does not necessarily invalidate the two above hypotheses as maintaining factors of insomnia. More specifically, either or both of the two hypotheses (mind racing and muscle tension) could cause and maintain insomnia.

One factor which may have accounted for the failure to obtain a difference in the treatment procedures was the utilization of tape-recorded therapy techniques. Paul and Trimble (1970) investigated the efficacy of tape-recorded versus live (therapist present) relaxation training. The data revealed that taped progressive relaxation was significantly inferior to live progressive relaxation. These researchers concluded by strongly advising against the routine use of tape-recorded relaxation

training in either research or clinical setting. They state, "In a clinical situation not only is the client unlikely to achieve deep muscular relaxation, but the use of impersonal techniques such as taped instructions will do little to increase either the client's motivation or his/her confidence in the therapist." Thus, since two of the treatment conditions (relaxation training and combined treatment) primarily utilized taped relaxation training, this could have accounted for the failure to obtain a difference. However, the ST treatment condition had a live therapist administering the therapy sessions; and if the utilization of tapes was an important factor in causing lack of significance, this treatment condition should have possibly done better than the others, which was not the case. However, the fact that this ST condition could have been less effective than the other therapy conditions regardless of whether it was presented via tapes or live makes it difficult to draw any definite conclusion regarding the tape hypothesis. Finally, all the insomnia studies which were reported in the earlier part of this paper utilized live therapy instructions during the course of their treatment sessions. The utilization of taped instructions may have had some effect on the lack of significance in this study.

Another factor accounting for the failure to obtain a difference could have been the use of group therapy

sessions rather than individual sessions. This is supported by the fact that the only experimentally controlled study which produced significant reductions in latency to sleep onset as mentioned in the introduction of this paper was by Borkovec and Fowles (1973). In that study each subject was seen individually by a clinical psychology graduate student for all of the therapy sessions. It appears plausible to assume that individual therapy produces a much closer rapport between therapist and client than in a group situation. Furthermore, the client would perceive greater interest and concern for his problem by the therapist on a one-to-one basis rather than when a client is merely a member of a group. Thus, group sessions may also have accounted for the failure to obtain a difference; however, again the degree of this effect is indeterminant or unknown.

The fact that four treatment sessions were crammed into two weeks for each subject could also have accounted for the failure to obtain a difference in this study. Thus, Borkovec and Fowles (1973) spread three, one-hour therapy sessions over three weeks in their controlled insomnia experiment. Practically all clinical therapy is done on a weekly basis, with clients usually coming in once or twice a week, being given therapy assignments to practice and coming in a week later to assess their progress. Furthermore, therapy in most clinical situations

rarely lasts only two weeks unless the problem is relatively minor. Therefore, a more practical appraoch would be similar to Borkovec and Fowles' (1973), namely to space out the therapy sessions to cover a longer period of time so that the client has a greater chance to practice his therapy techniques over time and to receive extended feedback from the therapist each week.

Perhaps the one main factor which in all probability accounted for the failure to obtain a difference in this study was a tremendous degree of within-subject variability in regards to average latency to sleep onset times. This can very easily be seen by referring to the extremely large standard deviations in each statistic in Table IV. Careful baseline analysis of individual subjects' daily reports of sleep latencies as related to their weekly averages indicates a highly erratic pattern of sleep latencies. Specifically, on two days out of seven, the subject might have latencies of 75 minutes; and for the remaining days the subject might have latencies of 20 minutes, thus giving an average latency to sleep onset for the baseline week of 36 minutes. Thus, it becomes apparent that this mean of 36 minutes does not validly reflect the majority of this subject's sleep latencies for the baseline week and is merely statistically inflated by two high data points. The answer to this problem would possibly be a more stringent criterion, namely, in order for a

subject to qualify to participate in the experiment his/her sleep latencies must be 30 minutes or greater for four or more days out of the seven-day baseline week. A more lengthy baseline assessment lasting for two weeks could also be instituted if greater accuracy in selecting subjects is further desired by the experimenter.

The final point regarding the paucity of significant results is in regard to the problem of using college students for clinical analogue studies. It is highly implausible to assume that subjects with latencies ranging from 30-45 minutes are insomniacs; furthermore, it might even be said that these individuals are not actually statistically different from the rest of their college peers in regards to these latencies. Monroe (1967) defined poor sleepers as those subjects who had median latencies to sleep onset of 60 minutes and mean latencies to sleep onset of 59.06 minutes. He further reports that even these subjects did not regard themselves as insomniacs. Thus, a new labeling procedure is needed in relation to sleep disturbances; namely, a procedure having set objective criterion established for each category. An example might be: median latency to sleep onset = 30-45 minutes, minor sleep disturbance; median latency to sleep onset = 60-120 minutes, high sleep disturbance; median latency to sleep onset = 120+ minutes, insomniac. After all, it would not be fair to define those individuals

with latencies within the 30-45 minute range as not having a sleep problem; instead what would be necessary is to differentiate the severity of the problem and then utilize concordant therapeutic techniques.

The most significant finding which resulted from this study was that roommates could reliably monitor subjects' sleep patterns, thereby providing a valid measure of sleep performance. Roommates were able to record when subjects got into bed and when they got to sleep with a high degree of accuracy. Reliabilities for latency to sleep onset were determined by subtracting the time to bed from the time to sleep as reported by the roommates and then correlating this data with the same data from the subjects. Thus, roommates were able to provide reports of latency to sleep onset for subjects with a moderate degree of agreement. Roommates could also report the time the subjects got up in the morning and the number of times the subjects awakened during the night with a fair degree of agreement. The results also indicated that the roommates across all treatment conditions produced significantly lower reliabilities for the dependent measure, amount of sleep, as compared with time to bed, time to sleep, and time up (see Table II). A possible reason for these low reliabilities could be due to the fact that roommates in all the treatment groups were not really sure of the subject's amounts of sleep and merely speculated

based on their own amounts of sleep. Thus it would appear that future researchers would not benefit from utilizing reliability checks on the dependent measure, amount of sleep. Further results indicated that across all six sleep measures (see Table IV), the treatment phase had significant lower reliabilities than the follow-up phase. The possible reasons for these differences could be due to the fact that during baseline the roommates were reporting the subjects' times accurately because the roommates were accustomed to the subjects' sleep patterns; however, during treatment weeks the subjects' sleep patterns were changing, and, therefore, roommates had less time to become familiar with the subjects' new sleep patterns and less often agreed with the subjects' self reported data. Thus, by the follow-up week, roommates had time to become accustomed again to the subjects' sleep patterns, and, therefore, roommates agreed with the subjects' self reports more often. Also in these same results, roommates of the subjects in all treatment groups across all phases of the experiment reported significantly lower reliabilities for the dependent measure, amount of sleep, than for dependent measures of time to bed, time to fall asleep, and time up in the morning. This finding confirms the above results which indicated that this same dependent measure, amount of sleep, across all treatment conditions produced the lowest reliabilities. Therefore, this further strengthens the

premise that future researchers should avoid the utilization of this dependent measure. Finally, reliabilities for latency to sleep onset were significantly lower across all phases of the study than the reliabilities for time to bed. A possible reason for this result could be that numerous discrepancies could arise between the roommate and subject in regards to actually determining when the subject was asleep; thus, since this is an integral part of determining latency to sleep onset it could have caused less agreements and lower reliabilities. Another plausible contributing factor to this result is that the reliability for latency to sleep onset was significantly lower than, namely, time to bed, is a relatively easy figure to compute and thus results in especially high reliabilities which would maximize the difference between the two. The importance of these results for clinical researchers in this field is that for the first time it provides a cogent illustration that roommates can be utilized as dependable data checkers, thereby providing objective reliability checks on the various dependent measures used in this area of research. Another hypothesis which was evaluated concerned the fact that by having roommates performing reliability checks, this would result in these subjects reporting their sleep time with less variability. The results indicated (see Table XIX), that only those subjects in the ST group who had

reliabilities taken reported significantly less variable sleep times than subjects in the same group without reliabilities being taken. Thus, it was difficult to assume that this single finding substantiates the hypothesis; however, it still lends some support to the hypothesis that the utilization of reliability checkers may reduce the variance in reported sleep times. Thus, by utilizing these reliability measures, researchers can further partial out the variance which arises from subjective error in reporting the various dependent measures, thereby giving their results more statistical power. Hopefully, the lessons learned in the execution of this current study can be utilized to design and perform more efficacious treatment strategies for future insomnia research.

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APPENDIX A: GENERAL SCREENING QUESTIONNAIRE

Experimenter: Tom Tokarz August 23, 1973

Please answer these following questions as honestly as possible. Thank You.

1. To what degree are you afraid of snakes?
   Place one X next to the level which is most applicable.

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

2. To what degree do you experience test anxiety prior to a test?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

3. To what degree do you feel depressed?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

4. To what degree are you disturbed about speaking in public?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

5. To what degree do you have trouble with insomnia (i.e., taking more than two hours to fall asleep at night)?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

6. To what degree do you feel anxious in situations involving interactions with other people?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

7. To what degree are you afraid of small insects?

   Not at all ____ a little ____ a fair amount ____
   much ____ very much ____

8. To what degree are you afraid of rats?

   Not at all ____ a little ____ a fair amount ____ much ____ very much ____

9. To what degree are you afraid of speaking up in class?

   Not at all ____ a little ____ a fair amount ____ much ____ very much ____

10. To what degree are you afraid of speaking to a professor in his office?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

11. To what degree are you afraid of asserting yourself towards others?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

12. To what degree do you feel your study skills are deficient?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

13. To what degree do you suffer from headaches?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

14. To what degree do you consider yourself to be underweight?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

15. To what degree do you consider yourself to be overweight?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

16. To what degree do you feel you have difficulty in carrying on a conversation with another person?

    Not at all ____ a little ____ a fair amount ____ much ____ very much ____

APPENDIX B: DAILY SLEEP QUESTIONNAIRE

Name _____ Date _____

Please fill out this questionnaire each morning as soon as you wake up or, at the latest, within 30 minutes of waking. The date given above is for the day on which it is filled out (not the date when you went to bed.) Please refrain from consuming alcohol, smoking grass, and especially from taking sleeping pills within at least three hours prior to going to bed.

ALL INFORMATION ON THIS QUESTIONNAIRE WILL BE STRICTLY CONFIDENTIAL.

1. What time did you get in bed to go to sleep? _____

2. What time did you fall asleep last night? _____

3. How much difficulty did you have in falling asleep initially last night?
   a. no difficulty _____
   b. very little difficulty _____
   c. moderate difficulty _____
   d. quite a bit of difficulty _____
   e. much difficulty _____

4. How many times, if any, did you awaken last night? ____

5. If you did awaken last night, what time was it when you work up? _____ What time did you fall asleep? _____ If more than once; time awakened _____; time asleep _____;time awakened _____; time asleep.

6. What time did you get up this morning? _____

7. How rested did you feel this morning?
   a. very rested _____
   b. moderately rested _____
   c. not very rested _____
   d. not rested at all _____

8. If by some unpredicted chance, you did smoke or drink within three hours prior to going to bed, please list what you had, in what quantity, and at what time last night.

a. what taken _____
b. what quantity _____
c. what time _____

9. Please describe any unusual circumstances which may have made it easier or more difficult to fall asleep last night. _____
_____
_____

10. If relevant, what day of your menstrual period is this (1st, 2nd, etc.)? _____

11. Please make any additional comments which you think are relevant to your sleep last night. _____
_____
_____

APPENDIX C: ROOMMATE DATA COLLECTION FORM

Please try to be as inconspicuous as possible when the data is taken. It is very important that you do not confer with your roommate regarding the data you collect. Also, it is crucial that you roommate not be aware of the days when you are collecting this data. Therefore, you can make it seem like you are collecting data for a few days when actually you are not. Above all, do not let your roommate see what data you write down and under no circumstances should you compare data with your rommate. The reason for this is that you are performing a reliability measure which means your data entry must be independent of your roommate's or not related to his entry in any way. Only by keeping your data independent from your roommate's can we hope to be able to determine if your roommate is keeping accurate records of his sleep times. Your roommate will be instructed when these data sheets are to be turned in. Place all data sheets which you have completed in the envelope that you received the forms in. Make sure at this time not to compare data with your roommate. Seal the envelope and give it to your roommate to bring in. He or she will turn in the data to us and return the envelope so that you can use it again to turn in the other data as the study progresses.

1. What time did your roommate go to bed to go to sleep? _____
2. What time did you determine he was asleep? _____
3. Were you aware of your roommate awakening during the night? _____ If so, how many times? _____
4. If you know first hand, what time did he wake up in the morning? _____

Date _____

1. What time did your roommate go to bed to go to sleep? _____
2. What time did you determine he was asleep? _____
3. Were you aware of your roommate awakening during the night? _____ If so, how many times? _____
4. If you know first hand, what time did he wake up in the morning? _____

Date _____

APPENDIX D: GENERAL SLEEP HISTORY QUESTIONNAIRE

(All information on this questionnaire will be confidential)

Please answer all questions (which apply) honestly and as accurately as possible.

1. Name _____ Age _____
   Phone Number _____

2. Roommate's name _____

3. Do you think that your roommate would be willing to cooperate with this study? _____

4. Please list the days and times when you can definitely be reached by phone. _____

5. On the average, how long does it take you to get to sleep at night (minutes)? _____

6. How many times per week do you fall asleep within five minutes? _____

7. How many times per week does it take more than 30 minutes to get to sleep? _____

8. How many nights per week do you awaken during the night? _____

9. How many times per night do you wake up? _____

10. If you do wake up during the night, on the average how long does it take you to get to sleep again? _____

11. How rested do you feel in the morning when you awake (on the average)? very rested _____, moderately rested _____, not very rested _____, not rested at all _____.

12. How much do you enjoy sleep? much enjoyment _____, moderate enjoyment _____, little enjoyment _____, no enjoyment _____.

13. When you get into bed and close your eyes, on the average do you continue to visualize past events that happened that day or during the past? _____ If yes, what percentage does this occur? (i.e., 50% of the time, etc.) _____

14. If you answered yes to the question above, do you find that you are unable to stop these events from being visualized? _____

15. Do you find that when you attempt to go to sleep at night that you are tense, especially in the major muscles of your body? _____ If yes, what percentage of the time does this occur? _____

16. Do you find that only specific events cause you to remain awake at night, (i.e., a test the next day, thoughts of a loved one, etc.)? _____ If yes, what percentage of the time does this occur? _____

17. How long does it take you on the average to get to sleep at night during the summer (if you are not in school)? (minutes) _____.

18. How long on the average does it take for you to get to sleep during the winter months? _____

19. Have you ever taken sleeping pills (non-prescription)? _____ If yes, what percentage of the time did you take them? _____ If yes, are you still taking them? _____ If you are, how many nights a week do you take them? _____

20. Have you ever taken prescription sleeping pills? _____ If yes, are you still taking them? _____ If yes, how long did you take them (in days)? _____ Do you know the name of what these sleeping pills were? _____ Was there some specific occurrence in your life that caused you to need these sleeping pills? (i.e., a death in the family, etc.) If so, please specify _____ Are you still taking prescription sleeping pills? _____

21. Are you currently seeing any other professional regarding your sleeping problem? _____

22. Have you ever seen a professional person for your sleeping problem? _____ If yes, who was it? _____ What facility was he or she connected with? _____ How long did you see this person? _____

23. If you have used non-prescription sleeping pills, how long on the average did you find that it took you to get to sleep once you took one? (minutes) _____

24. Do you currently use anything to help you get to sleep? (alcohol, grass, etc.) _____
If so, what quantities do you use on the average? (i.e., 2 cans of beer) _____
On the average, how many nights of the week do you use these sleep aides? _____

25. Do you have some specific event that consistently (50% of the time or more) keeps you awake? (i.e., worrying about failing out of school) _____
_____

26. List three events which you think about as you are going to sleep on most nights. List the one which occurs most frequently first, then the second most frequent next, etc.
(1) _____
(2) _____
(3) _____

27. Do you feel that there is an excess amount of noise which keeps you awake in the environment where you are living? _____ If yes, what percentage does this contribute to your total insomnia? _____

28. At what age did you start taking 30 minutes or more to get to sleep at night? _____ What was an approximate date when you first started taking more than 30 minutes to get to sleep? (i.e., middle of June, 1971) _____

29. Please list every year since the time you first started (onset) taking more than 30 minutes to get to sleep, and approximately how many days a month on the average it took you 30 minutes or longer to fall asleep. (i.e., onset age of 19;---23 times a month; age of 20;---25 times a month, etc.) _____
_____

30. If it has only been a few months since your insomnia started, list every month, starting from the first month at which it started, and state how many days out of each month that it took you more than 30 minutes to fall asleep. _____
_____

31. List each year starting from the onset of your insomnia and approximately how long (on the average) it took to fall asleep that year. (i.e., onset age of 19;---40 minutes; age of 20;---50 minutes, etc.) For those people who have only had their insomnia for a few

months, list each month starting from onset and the approximate amount of time it took to fall asleep each month up to and including the present month.

_____

_____

32. How long on the average has it taken you to get to sleep over the past four weeks? (i.e., last week-45 minutes, week before that-35 minutes, week before that-50 minutes, etc.) _____

33. How many days out of the last four weeks has it taken you more than 30 minutes to get to sleep? (i.e., last week - 4 days, week before that - 5 days, etc.)

_____

34. Do you take naps during the day? _____ If so, how many? _____ How long does each last ? (minutes) _____

35. What do you think is causing your insomnia? (please describe fully) _____

_____

_____

_____

APPENDIX E:

DAILY CHECKLIST FOR PERFORMANCE OF THERAPY TECHNIQUES

1. Remember to practice your therapy technique twice each day for approximately 10 minutes each time, with one practice session occurring just prior to bedtime. Both practice sessions should be done on your bed in a reclined position.

2. Please mark down in the spaces below the date and the times which you perform each of these practice sessions.

3. These practice sessions are for your own benefit and if you expect to see improvement in your insomnia you must perform these practice sessions every day without fail.

4. In order to get to sleep sooner, you should perform your therapy procedure while you are attempting to go to sleep each night. (This is <u>in addition</u> to your 2 practice sessions.)

5. Please perform these practice sessions until you are notified to stop them.

	First Practice Session		Second Practice Session	
DATE	time started	time finished	time started	time finished