



Western Michigan University
ScholarWorks at WMU

Dissertations

Graduate College

8-1992

Applied Relaxation Training in the Treatment of Genital Herpes

Kent A. Koehn
Western Michigan University

Follow this and additional works at: <https://scholarworks.wmich.edu/dissertations>



Part of the Health Psychology Commons

Recommended Citation

Koehn, Kent A., "Applied Relaxation Training in the Treatment of Genital Herpes" (1992). *Dissertations*. 1923.

<https://scholarworks.wmich.edu/dissertations/1923>

This Dissertation-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Dissertations by an authorized administrator of ScholarWorks at WMU. For more information, please contact wmu-scholarworks@wmich.edu.



**APPLIED RELAXATION TRAINING IN THE
TREATMENT OF GENITAL HERPES**

by

Kent A. Koehn

**A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Psychology**

**Western Michigan University
Kalamazoo, Michigan
August 1992**

APPLIED RELAXATION TRAINING IN THE
TREATMENT OF GENITAL HERPES

Kent A. Koehn, Ph.D.

Western Michigan University, 1992

Four individuals with frequent recurrences of genital herpes simplex virus (HSV) were trained in Applied Relaxation (AR). Participants included in the research were all women, had been diagnosed with herpes at least one year prior to the study, experienced 6 or more outbreaks annually, and were not taking antiviral medications.

The experiment employed a multiple baseline across subjects design with individual baselines of 11, 13, 17, and 21 weeks. Participants maintained daily diary recordings of the frequency, duration, and severity of their herpes activity from baseline until a minimum of three months post-treatment.

Treatment consisted of 10 individual AR sessions. Pre-training and post-training frontalis electromyographic activity measures of the subjects' ability to relax during rest and their ability to apply the relaxation skill during stressful roleplays were obtained. The subjects recorded pre-treatment to post-treatment reductions in herpes frequency of 67%, 46%, 90%, and 69%.

These changes were statistically significant across all subjects as a group and individually for three of the four subjects. These results suggest that AR is an effective technique for reducing recurrent HSV infections.

INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Order Number 9233304

Applied relaxation training in the treatment of genital herpes

Koehn, Kent A., Ph.D.

Western Michigan University, 1992

U·M·I

300 N. Zeeb Rd.
Ann Arbor, MI 48106

ACKNOWLEDGMENTS

I would like to acknowledge the instrumental involvement of several people in the successful completion of this research and for their significant contributions to my training. I want to particularly thank my advisor and committee chairperson, Dr. M. Michele Burnette, for the initiation of our research in this area and her direction, assistance, and support throughout the study. I wish to express a sincere appreciation to my dissertation committee members, Dr. R. Wayne Fuqua, Dr. William K. Redmon, and Eric Green, M.D. for their guidance, assistance, and timely readings and helpful editing of this dissertation.

I would like to generally thank the members of our research group for everyone's discussion, problem-solving, and support. I especially thank Carman Stark and Rita Kenyon-Jump for their laboratory assistance, comments, suggestions, and friendship.

My deepest appreciation, thanks, and gratitude are extended to my wife, Denise, and my son, Blake, for their love, unending encouragement, patience, support, and sacrifice across this study and my graduate training.

Kent A. Koehn

TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	ii
LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
INTRODUCTION.....	1
METHOD.....	9
Subjects.....	9
Materials.....	10
Equipment and Setting.....	10
Dependent Measures.....	11
Pre- and Post-Treatment Questionnaires.....	11
Daily Measures.....	11
Procedure.....	14
Treatment.....	15
Treatment Integrity and Consumer Satisfaction.....	17
Pre- and Post-Treatment Relaxation Evaluations.....	17
Pre- and Post-Treatment Relaxation Application Evaluations.....	18
Experimental Design.....	19
RESULTS	21
Herpes Activity	21
Herpes Frequency.....	21

Table of Contents--Continued

Herpes Duration.....	22
Herpes Severity.....	22
Pre- and Post-Training Tension Ratings and Practices.....	23
Pre- and Post-Treatment Relaxation Evaluations.....	23
Pre- and Post-Treatment Relaxation Application Evaluations.....	24
Consumer Satisfaction.....	25
Pre- and Post-Treatment Questionnaires.....	25
DISCUSSION.....	27
APPENDICES	
A. Informed Consent.....	36
B. Daily Self-Monitoring Diary.....	38
C. Applied Relaxation Training for Genital Herpes Training Protocol.....	40
D. Consumer Satisfaction Questionnaire.....	54
E. Human Subjects Review Board Approval.....	56
F. Laboratory Assessment Instruction.....	58
G. Tables and Figures.....	60
BIBLIOGRAPHY.....	68

LIST OF TABLES

1. Subject Characteristics.....	61
2. Mean Days per Week With a Herpes Outbreak and Percent Change Across Pre- and Post- Treatment for Each Subject.....	63
3. Mean Duration of Herpes Outbreaks and Percent Change Across Pre- and Post-Treatment for Each Subject.....	63
4. Mean Pre- and Post-Session Subjective Tension Levels Across Training and Mean Number of Days per Week Subject Used Relaxation Skill After Training.....	64
5. Within Session Percentage Change in EMG and STL Measures From Minute 1 to Minute 10 of Self-Control Relaxation Phase and Overall Difference Scores.....	65
6. Mean Percentage Change in EMG (Reactivity) Across Pre- and Post-Training Role Play Application Phases.....	66
7. Summary of Mean Psychosocial Scores at Pre- and 3-Months Post-Training.....	67

LIST OF FIGURES

1. Days per Week With an Outbreak for Each Subject... 62

INTRODUCTION

Herpes simplex virus type 2 (HSV) is a major health problem affecting as many as 25 million Americans (Johnson et al., 1989). It is estimated that there are approximately 500,000 new cases annually (Centers for Disease Control, 1982). The virus most commonly infects the genitalia and is primarily sexually transmitted. Once the individual is infected, the herpes virus remains latent in the sacral root ganglia and may periodically reactivate, travel down the nerve to the skin surface, and result in small, single or multiple clusters of blisters on or surrounding the genital area. Other commonly experienced symptoms include pain, itching, swollen glands, fever, vaginal discharge, dysuria, headache, and muscle aches. Genital herpes is associated with high neonatal mortality (Nahmias & Visintine, 1976), cervical carcinoma (Josey, Nahmias, & Naib, 1976) and recently with increased risk of contracting human immunodeficiency virus (Holmberg, Stewart, & Gerber, 1988).

There is no medical cure for the virus, and effective pharmacological treatment (acyclovir) is limited to the initial outbreak and does little more than shorten the healing time of recurrent lesions. In addition, medication-related concerns regarding long-term toxicity,

cost, drug-resistant strains, and more severe recurrences following the termination of the drug also limit its utility and acceptance among many herpes sufferers (Ashley & Corey, 1984; Douglas et al. 1984; Guinan, 1986). Alternative psychotherapeutic treatments (e.g., Drob, 1985; Drob & Bernard, 1985; Drob, Bernard, Lifshutz, & Nierenberg, 1986) have provided benefit to people with genital herpes by focusing on the negative psychosocial aspects associated with having this disease, but they have not attempted to impact the frequency of recurrences themselves.

Genital herpes recurrences vary substantially with some sufferers never experiencing another lesion after an initial outbreak while nearly 50% have between 6 and 12 outbreaks per year (Bierman, 1983). Understandably, such a high number of outbreaks is a significant problem for those infected with the virus. What accounts for the variability is not known. A number of physical or biochemical stressors such as skin irritation from exposure to sun and wind, illness, menstruation, fatigue, sexual intercourse, and severe emotional experiences are thought to reactivate the virus (Bierman, 1983; Lynch, 1982). Other researchers have linked a variety of psychosocial factors to HSV recurrences. Higher rates of outbreaks have been associated with increases in recent stressful life events (Watson, 1983), higher number of negative

life events (Taylor, 1979), less herpes-specific social support (VanderPlate, Aral, & Madger, 1988), levels of stress, mood, and social support (Kemeny, Cohen, Zegans, & Conant, 1989), depression, anxiety, and obsessionality (Goldmeier & Johnson, 1982), stress and emotional distress (Longo & Clum, 1989), and emotional dysfunction (Silver, Auerbach, Vishniavsky, & Kaplowitz, 1986).

Several researchers (e.g., Bierman, 1983; Stout & Bloom, 1982; and Gruchow, 1979) have hypothesized that such environmental-psychological factors activate the neuroendocrine system which in turn modulates the cellular immune system resulting in the reactivation of the dormant virus. Accordingly, chronically elevated levels of physiological arousal may diminish the body's immunological efficiency and thereby result in higher recurrence rates. Although the relationship between psychosocial factors and recurrence rates is often based on correlational, retrospective, and clinical reports, and contradictory findings have been reported (for review see VanderPlate & Aral, 1987), the findings tend to support the contributory role of psychosocial stress in the disease process.

Given the research evidence for stress-related factors as antecedents to (as well as consequences of) frequent herpes recurrences, a logical intervention would be a psychotherapeutic strategy that specifically

attempts to reduce recurrence rates. Surprisingly, since 1960 only six studies have been reported in the literature on the effects of psychologically-based interventions to reduce disease recurrence among herpes sufferers.

Gould and Tissler (1984) and Surman and Crumacker (1987), in case studies, anecdotally reported successful reductions in herpes recurrence rates using hypnosis. A small group cognitive-restructuring intervention was associated with significant decreases in recurrence rates at a 12-week follow-up when compared to a structured discussion control group (McLarnon & Kaloupek, 1988). The validity of the results of this study is questionable due to the small number of subjects involved (8) and because herpes activity was estimated over short pre-treatment and follow-up intervals. Longo, Clum, and Yaeger (1988) report significant reductions in herpes activity using a 6-session, group format, multicomponent psychosocial intervention involving information, relaxation training, stress management, and imagery techniques. Conclusions regarding the effectiveness of this approach must be considered tentative due to retrospective monthly recordings of herpes activity and poor treatment compliance. It also is unknown whether the actual reductions in the number of outbreaks obtained were therapeutically significant for the subjects. VanderPlate and

Kerrick (1985) reported estimated 66% and 100% reductions in frequency of recurrences for two subjects following progressive muscle relaxation training and 72% and 7% reductions for two subjects treated using frontalis electromyographic biofeedback training. The results of this study are difficult to interpret given the lack of a baseline recording period, absence of a control group, and the small number of subjects. Non-specific treatment effects also cannot be ruled out since subjects evidenced reductions in muscle tension only within training sessions and not across sessions.

Burnette, Koehn, Kenyon-Jump, Hutton, and Stark (1991) assessed the efficacy of progressive muscle relaxation to reduce herpes recurrence rates using a multiple baseline across subjects design. In addition to using a controlled research design, this study improved upon previous research by monitoring daily herpes activity from a minimum 3-month baseline until 3-months post-treatment. Six of 8 subjects with high HSV recurrence rates reported substantial reductions in the frequency of their outbreaks. Despite this apparent improvement, two subjects received antiviral medications throughout the study which confounds the interpretation of the treatment's effectiveness. It is also unclear whether these subjects actually acquired and used the relaxation skill. No electromyographic assessments were obtained to assess

their ability to reduce muscle tension and training did not focus on a skill to be applied to real-life settings that are presumed to contribute to higher recurrence rates.

Although the above stress reduction interventions appear promising as effective treatments for individuals with recurrent genital herpes, each suffers from methodological weaknesses that limit conclusions regarding their efficacy. A summary of the major limitations of most of these studies includes:

1. The primary dependent variable (i.e., herpes recurrences) has not been adequately defined, and given the intermittency of the disease, has been prospectively monitored in only one study for sufficient periods during baseline, post-treatment, and follow-up.
2. The confounding benefits of anti-viral medications have not been ruled out.
3. Group designs involving small numbers of subjects and inferential statistical analyses to make comparisons limit interpretation of results.
4. None of the studies assessed the practical significance of reductions in herpes activity. It is not known whether the improvements observed were large enough to be considered important.
5. It also has not been demonstrated whether the subjects actually learned and then employed the stress-

reduction skills outside of the therapeutic environment.

Consistent with the growing interest in training relaxation skills as an in-vivo response (e.g., Chang-Liang & Denney, 1976; Deffenbacher, 1976; King, 1980; Ost, 1987), this study will use an active relaxation training technique, Applied Relaxation (AR), to promote generalization and maintenance of the relaxation response to further reduce HSV recurrence rates. Applied Relaxation has been shown to be effective in the treatment of panic disorder (Ost, 1988), chronic pain (Linton & Gotestam, 1984), and tension headache (Larsson & Melin, 1986). Follow-up assessments in each of these studies reveal that not only were treatment effects maintained but that further improvements were made among the subjects after training ended, suggesting that subjects acquire a skill that is potent in producing lasting benefits.

Relative to previous research, this study more adequately assessed the effects of a behavioral stress-reduction intervention by using a multiple baseline design across subjects while prospectively monitoring herpes activity. This study attempted to replicate the positive results of Burnette et al. (1991) and VanderPlate and Kerrick (1985) by assessing the subjects' pre-treatment and post-treatment abilities to decrease their arousal during "real-life" stressor tasks and by

explicitly training subjects to reduce their arousal and apply the relaxation skill across natural situations. Furthermore, the present study included a skill maintenance component across non-medication controlled subjects with high HSV recurrence rates.

It was hypothesized that training in AR would be effective in reducing the frequency and severity of genital herpes recurrences and result in subjects' reporting improvements on indices of psychological adjustment.

METHOD

Subjects

Ten subjects, all suffering from genital herpes, were recruited from an article in the local newspaper and from physician and health center referrals. Subjects selected for inclusion in the treatment study met the following eight criteria: (1) frequently recurring genital herpes, defined as self-reports of recurrence rates of greater than six or more in the year prior to the study (to ensure a sensitive measure of the treatment's effectiveness); (2) contracted the virus at least one year prior to the study; (3) provided positive laboratory test results and/or physician's confirmation of a diagnosis for the genital herpes simplex virus; (4) agreed not to take antiviral therapy or other immunosuppressive therapy across the course of the study; (5) were in good general health as determined by a health questionnaire; (6) agreed to be assigned randomly to 8, 10, or 12-week no treatment baseline interval prior to treatment; (7) agreed to maintain daily diary recordings of herpes related symptomatology, illnesses, stress events, and treatment compliance; and (8) agreed to sign a contract to practice relaxation techniques. All subjects

were required to give written informed consent after the assessments and procedures had been fully explained (see Appendix A). Subjects received \$25.00 for participation and three of the four study completers also earned an additional \$10.00 for meeting the weekly criterion number of relaxation practices (3) across training. Of the ten subjects invited to participate, one dropped out after 2 weeks due to leaving the area, one declined to participate after the initial interview stating it would be too far to drive, and one dropped out citing school and personal problems. Three subjects were dropped from the study after recording no baseline herpes outbreaks on their diary records following monitorings of 11, 12, or 24 weeks. This left four subjects who completed the study. All subjects were female, ages 21, 31, 41, and 41, and reported recurrence rates of ranging from 7 to 12 per year. A summary of subject characteristics is presented in Table 1 (see Appendix G).

Materials

Equipment and Setting

Frontalis electromyogram (EMG) was monitored at pre- and post-treatment during relaxation tests. Physiological recordings were obtained with a Grass Model 7 polygraph. Forehead EMG was measured through attachment of electrodes to alcohol-cleansed skin on the forehead

directly over each pupil at a distance approximately 2.5 cm above each eyebrow and with the ground centered on the forehead.

All laboratory and relaxation training sessions were held in a 10 by 12 foot sound-attenuated, electrically-shielded, and temperature-controlled experimental chamber. The room was equipped with comfortable recliner chair for the subject and chair for the experimenter or trainer.

Dependent Measures

Pre- and Post-Treatment Questionnaires

Each participant completed the following questionnaires at pre- and three months post-treatment: (a) State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), (b) Hopkins Symptom Checklist-Revised (SCL-90-R; Derogatis, 1977), (c) Daily Hassles Scale, (DHS; Kanner, Coyne, Schaefer, & Lazarus, 1981), (d) Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961), and (e) the Multi-Dimensional Health Locus of Control Scale (MHLC; Wallston, Wallston, & DeVellis, 1978).

Daily Measures

All subjects were required to record on a pre-printed daily diary (see Appendix B) the following

information: (a) the presence of a herpes sore and associated primary symptoms of pain and itch on five-point scales with 0 = symptom not present, 1 = mild, 2 = moderate, 3 = severe, 4 = very severe, (b) overall stress level each day on a 0-4 Likert scale with 0 = none to 4 = very severe, (c) major life events occurring each day, (d) overall coping level each day on a 0-4 Likert scale with 0 = not coping at all to 4 = coping extremely well, (e) medications taken, illnesses, and any other factors thought to be associated with herpes recurrences, and (f) relaxation practice information.

The daily diary was used to determine HSV recurrence frequency, severity and duration. Subjects were provided with packets containing three months of diaries along with pre-addressed stamped envelopes for returning the data weekly. Subjects recorded their herpes activity on the daily diary forms from entry through a minimum of 3 months post-treatment and then tracked their recurrences by marking the days with an outbreak on a calendar.

Recurrence Definition

A herpetic recurrence was said to be present when a subject reported his or her typical symptoms and any number of macular, papular, vesicular, pustular, ulcerative, or crusted lesions in areas of prior genital infection.

Each subject's usual symptomatology was discussed, and photographed examples and non-examples of HSV lesions were used to further train subjects in consistent daily diary recordings of their outbreaks. To establish whether the subjects could correctly identify a herpes sore, subjects were shown 5 pictures of a variety of dermatological disorders that shared some characteristics of the herpes virus and 5 pictures of herpes. The pictures were presented randomly and the subjects were asked to detect whether or not the picture was a herpes sore. Each subject correctly identified all of the herpes virus pictures. The overall mean percentage of correct detections were 90%, 80%, 100%, and 90%.

All diary data were scored by one person. From the diary, an outbreak was determined by counting the number of days in that week that the participant recorded any of the primary symptoms of their outbreak (e.g., pain, itch, soreness). In addition, to be scored as an outbreak, these symptoms needed to be followed by the participant checking the presence of a "clearly visible" sore on the diary. A second person scored 50% of the subjects' diaries. The inter-rater reliability (number of agreements/number of agreements plus disagreements x 100) was 99%.

All subjects reported outbreaks in the outer labial area which enabled a more reliable measure of the

presence of a sore. No attempt was made to obtain clinical verification of subjects' recurrence reports due to its impracticality.

Procedure

All individuals interested in participation in this study were contacted and scheduled for an individual interview by the primary investigator, who also conducted all assessment and treatment sessions. Subjects were informed that the study would assess the effectiveness of a stress-reduction treatment on decreasing herpes recurrence rates, and the general procedure was explained. The voluntary nature of the study and confidentiality issues were discussed and informed consent obtained. The interview was structured to obtain demographic and background information including age, marital status, education, previous therapy experience, medication use, primary infection date, knowledge of the source of their infection, symptoms experienced, and potential antecedent events to outbreaks and consequences from having herpes. Subjects were asked to provide documentation of their HSV diagnosis from their doctor. Signed release of information forms were obtained in order to contact their physicians for this purpose. Next, the questionnaire battery was administered. Subjects then were trained in recording their daily herpes-related symptomatology and

associated information and were given a packet of diaries. Finally, subjects were scheduled for pre-treatment relaxation evaluations.

Treatment

A modified version of Applied Relaxation using the manual described by Ost (1987) was used (see Appendix C for a complete training protocol). Training consisted of 10 hourly sessions across a 5-week period. Treatment included the following major components: (a) rationale and educational materials, (b) progressive muscle relaxation, (c) release-only relaxation, (d) cue-controlled relaxation, (e) differential relaxation, (f) rapid relaxation, and (f) applied relaxation training.

Session 1 included presenting of information on herpes, stress, the immune system, the rationale for AR and its potential for reducing HSV activity. Sessions 2 through 4 were devoted to an adapted version of Bernstein and Borkovec's (1973) manual for progressive muscle relaxation. At this point, subjects signed a contract which specified when, how long, and how often they would practice the skills for the remainder of the study. Sessions 5 and 6 were devoted to release-only relaxation and cue-controlled relaxation, respectively. During Session 7 subjects were trained in differential relaxation. Subjects practiced relaxing while sitting in an

ordinary chair, while at a desk writing, while standing and walking about the laboratory, and while engaging in conversation. In session 8 rapid relaxation was introduced as a method of teaching subjects to relax quickly in natural but non-arousing settings. Sessions 9 and 10 were devoted to application training where the subject began applying the skill to stressful situations. Subjects were briefly exposed to a variety of anxiety-arousing situations, e.g., hyperventilation, imagery of previously stressful events, exercise, and role plays during which they were asked to observe their stress response and practice counteracting it through relaxation.

During relaxation training sessions, subjects rated their subjective tension levels (STL) pre- and post-relaxation on a 0-100 scale, where 0 represented "totally relaxed" and 100 represented "most tension imaginable." Percentage change in pre- to post-relaxation served as a measure of skill acquisition during training.

Subjects were given homework assignments to practice the relaxation techniques in situations outside the therapy session and a maintenance strategy was set up at the end of the treatment phase. Subjects were encouraged to develop the habit of scanning their body at least once per day and to use the rapid relaxation technique to get rid of any tension. Subjects were asked to practice differential or rapid relaxation three times a week on a

regular basis. Practices were documented throughout the treatment and 3-month post-treatment periods on the diary forms.

Treatment Integrity and Consumer Satisfaction

To make valid inferences on the basis of the results of a treatment it is necessary to establish that the treatment was administered in an appropriate way (Kazdin, 1980). To ensure that the treatment was applied as intended, the therapist followed a detailed protocol that stipulated the content of each treatment session.

Subjects also completed a 10-item Likert scale questionnaire to evaluate the subjects' satisfaction with the treatment (see Appendix D). The subjects rated the quality of the relaxation training, how logical it seemed, its helpfulness in reducing recurrences and in coping with genital herpes, and if they would recommend the program to others. All ratings were recorded across a 1 to 5 Likert rating scale with 5 being the most favorable.

Pre- and Post-Treatment Relaxation Evaluations

Prior to and following treatment, each subject's ability to relax was evaluated. Subjects were seated in the experimental chamber and told to sit quietly for a 10-minute adaptation period after which their muscle tension was assessed. This phase was followed by the

attachment of the EMG electrodes, and the subjects were asked to give a rating of their relaxation level in terms of subjective units of distress (SUDS; 0 to 100, where 0 = totally relaxed and 100 = maximum tension). Subjects were instructed to attempt to become as relaxed as possible while EMG measures were obtained across the next 10 minutes and another SUDS rating was obtained (see Appendix F for complete laboratory instructions). Within session percentage change in EMG and subjective tension levels from minute 1 to minute 10 of this self-control session were calculated as a measure of their pre- and post-training relaxation ability.

Pre- and Post-Treatment Relaxation Application Evaluations

Subjects' ability to relax was assessed during three stressful role plays at pre-treatment and at post-treatment as a measure of skill acquisition and generalization. A combination of standardized and individualized role plays constructed from each subject's response to the Daily Hassles Scale were used in this assessment. The standardized role plays consisted of a 3-minute interaction regarding a stressful situation that is commonly encountered in everyday life. Subjects were encouraged to respond to the situation as if it were real. As examples, one role play required subjects to interview for a new job; another required subjects to

confront a landlord about a recent rent increase. Role play actors were varied across subjects and sessions. The actors received a written scenario of each role play describing the manner in which they were to act and suggested specific verbal responses to be emitted during the role play. Actors were instructed to arouse the subject by progressively obstructing and challenging the subject's statements.

The mean EMG percentage change from baseline across the three role plays was obtained for pre- and post-treatment. Percentage change scores from pre-treatment to post-treatment were then calculated (i.e., mean of session 2 minus mean of session 1 divided by mean of session 1). These values served to evaluate the subjects' ability to apply the skill in simulated stressful situations.

Experimental Design

A multiple-baseline across subjects design was used. This design demonstrates the efficacy of the intervention when a change in each subject's recurrence rate is observed following the introduction of the relaxation training. Subjects monitored their herpes symptoms until a consistent pattern was established prior to treatment. This resulted in baseline conditions of 11, 13, 17, and 21 weeks across subjects. After the individual baseline

periods, the 10-session AR intervention was applied to each of subjects until all persons had received the treatment. All subjects recorded the detailed herpes activity and related information from baseline through a minimum of 3 months following the last treatment session.

RESULTS

Herpes Activity

Herpes Frequency

Days per week with an outbreak are displayed in Figure 1 separately for each subject (see Appendix G). The individual baseline conditions were 11, 13, 17, and 21 weeks. Post-treatment data were collected for 25, 17, 23, and 13 weeks for each subject, respectively. The mean frequency and percentage change from pre- to post-treatment for each subject also are presented in Table 2 (see Appendix G). As can be seen, all subjects reported mean reductions in their herpes activity following treatment. Subjects 1, 3, and 4 showed the greatest decreases in the frequency of their outbreaks. Subject 3 was symptom free immediately following treatment and reported one outbreak lasting 6 days during the first seven weeks of post-treatment. This subject's herpes activity then returned to a level approximately equal to pre-treatment. A one-tailed dependent t -test was conducted to compare baseline and post-treatment means across all subjects as a group. Independent t -tests were also conducted to compare pre-treatment and post-treatment means for each subject. There was a significant overall mean difference

between pre-treatment ($M = 2.56$) and post-treatment ($M = 1.10$) across all subjects ($t(3) = 2.87$), $p < .05$. The mean pre- to post-treatment differences were significant for Subject 1 ($t(34) = 2.29$, $p < .05$); Subject 2 ($t(28) = 2.57$, $p < .05$); and Subject 3 ($t(39) = 2.09$, $p < .05$). Subject 4's pre- to post-treatment mean difference was not statistically significant ($t(33) = 1.21$, $p = .24$). This subject's post-treatment interval was considerably shorter than her pre-treatment phase (13 versus 21 weeks) which decreases the power of the test statistic.

Herpes Duration

The mean herpetic duration, as determined by consecutive days with a scorable outbreak, for each subject's pre- and post-treatment outbreaks was calculated. These means and the percentage change are presented in Table 3 (see Appendix G). All subjects evidenced percentage reductions in the durations of their outbreaks from pre- to post-treatment although only one subject's change (Subject 3) was significant. The individual percent reductions were: 5%, 6%, 60%, and 30%.

Herpes Severity

Pre-treatment and post-treatment severity means were calculated for each of the most frequently recorded herpes symptoms. Subjects rated these symptoms on a 0 to

4 severity scale on the diary. All subjects reported the same primary symptoms of pain and itch. These two symptoms were individually averaged for pre- and post-treatment phases. The mean pre- and post-treatment severity measures were rated in the mild to moderate range across both experimental phases (mean pain pre- = .73, post- = 1.03; mean itch pre = 1.21, post- = .60).

Pre- and Post-Training Tension Ratings and Practices

During relaxation training subjects provided pre- and post-session Subjective Tension Ratings as a measure of their ability to relax. Subjects also maintained a log of their relaxation practices for a minimum of 3 months post-treatment on their daily diaries. These tension levels and the use of the relaxation skill after training are reported in Table 4 (see Appendix G). Three of the four subjects recorded mean reductions in their STLs of 72% or greater during the training sessions. All subjects except Subject 2 met the criterion of 3 home practices per week.

Pre- and Post-Treatment Relaxation Evaluations

As a measure of their ability to relax and having acquired the skill, subjects were evaluated during self-control relaxation attempts prior to and following relaxation training. Electromyographic activity measures

and pre-post STL ratings were obtained during a ten-minute period where they were asked to attempt to become as relaxed as possible. Within-session percentage change and overall difference scores (based on absolute pre-training minus post-training values) were calculated on the EMG and STL measures. These values are reported in Table 5 (see Appendix G). As shown, Subjects 1, 2, and 4 demonstrated greater reductions in both their EMG and reported tension ratings at posttraining than at pre-training. Subject 1's EMG and STL values were only minimally different across the two assessment phases. Subject 3 exhibited a decreased ability to relax during the post-treatment self-control session as shown by her EMG increase. In contrast, she reported an absolute STL decrease of 56 across the two sessions indicating she became more relaxed.

Pre- and Post-Treatment Relaxation Application Evaluations

The participants' ability to relax during simulated stressful situations was evaluated to determine whether they could actually apply the relaxation skill they had been taught. As described above, the mean EMG values were obtained across three role play conditions at pre- and post-training. The mean percentage change (reactivity to stressor) was then calculated within each session. Percentage change was chosen to control for the

confounding effects of individual baseline differences and to permit comparison across sessions and individuals. These values are presented in Table 6 (see Appendix G). A lower percentage change in Session 2 relative to Session 1 indicates increased ability to apply the relaxation skill. Only Subject 1 showed this ability. All three other subjects showed greater reactivity in Session 2 than in Session 1.

Consumer Satisfaction

The subjects' mean ratings on the consumer satisfaction questionnaire were calculated across the 1 to 5 Likert scale (1 = poor, 5 = excellent). The average subject's ratings of the quality of the training was 4.75; whether the training helped them to deal more effectively with herpes, 4.25; and the extent that the treatment met their needs, 4.25. They rated whether they would recommend the program to other herpes sufferers, 4.5, and gave an overall satisfaction rating of 4.75.

Pre- and Post-Treatment Questionnaires

Pre- and post-treatment questionnaire responses are summarized in Table 7 (see Appendix G). As can be seen, there was a trend for all subjects to show a reduction in the SCL-90-R, STAI, and Beck Depression Inventory scores from pre- to post-treatment. With the exception of

Subject 2, these values were all within normal ranges at both assessment periods. Subject 2 endorsed significant distress at pre-treatment across each of these measures. At pre-treatment she scored at the 86th percentile on the SCL-90-R, and 94th and 93rd percentiles, respectively, on the STAI State and Trait scales when compared to adult non-patients. Her percentile rankings at post-treatment on these measures were 79%, 77%, and 86%. Her Beck Depression score indicated severe depression at pre-treatment and fell to a normal level at post-treatment. The Multidimensional Health Locus of Control information did not differ remarkably from pre-treatment to post-treatment across subjects. All subjects endorsed health coping styles that indicated internally-based versus external or chance locus of control.

DISCUSSION

This study examined the effect of training Applied Relaxation skills in reducing herpes simplex virus recurrence rates among 4 non-medicated subjects with frequent outbreaks. The results support the hypothesis that AR is an effective technique for controlling the frequency of HSV recurrences and replicates the results of a previous relaxation study (Burnette et al., 1991). Following training, all subjects demonstrated obvious mean reductions in the frequency of herpes recurrences over pre-treatment levels. Moreover, these reductions were statistically significant when the group pre-treatment to post-treatment means were compared and also significant individually for 3 of the 4 subjects. The fourth subject had only 1 outbreak following treatment, but, apparently due to a shorter post-treatment period relative to pre-treatment, the power to detect a true difference was compromised.

Mixed benefits were found in the duration of the participants' outbreaks. All subjects showed reductions in the duration of their outbreaks but for only 2 subjects was this change large. No improvement was observed on severity measures. That minimal change occurs in duration and severity suggests that once the virus has

been reactivated, relaxation practice has no obvious benefit on the course of the outbreak. This would indicate that the benefit of relaxation is preventative rather than remedial.

Little change was evident in the psychosocial measures from pre- to post-treatment with the exception of Subject 2. It should be noted that except for this subject, the baseline levels of distress, anxiety, depression, and health locus of control all were within the normal range and, therefore, were insensitive measures of any treatment-based change. That changes in herpes recurrence rates were evident when most of these participants were not severely distressed suggests that the intervention is a potent technique.

Despite the improvement each subject experienced, Subject 2 could be considered an overall nonresponder. This subject reported having an outbreak almost continuously across the pre-treatment period. In the first 7 weeks following treatment, she experienced only one outbreak which represents a dramatic improvement over pre-treatment. Unfortunately her outbreak frequency returned to near pre-treatment levels. Several explanations are possible for the lack of lasting benefit. This subject reported the least number of relaxation practices and was the most distressed of the four subjects. In a sense the initial improvement followed by return to

previous levels represents a reversal to baseline which strengthens the validity of relaxation as an effective treatment. Unfortunately, the subject was not available to reinstate the treatment and monitor for subsequent benefit. This participant offered numerous herpes and non-herpes concerns during the initial interview and across the training sessions. While relaxation clearly imparted a benefit for her, other interventions that provide techniques focused on communicating about herpes, stress management, interpersonal relationships, assertiveness, and treatment providing herpes-specific support may produce even larger gains. This subject reported that she had not responded to acyclovir prior to the study. It is unknown how the medication was prescribed or what her compliance level was. It might be expected that a large dose administered over an extended period as has been beneficially demonstrated by Straus et al. (1988) would be a recommended option for her.

Given the drop in herpes outbreak frequency was of large magnitude and occurred immediately following treatment across subjects provides substantial support to the validity of the treatment's effectiveness. Nevertheless several concerns and alternative explanations for the observed outcomes are noteworthy.

One consideration is that the subjects in this study did not demonstrate large improvements in their ability

to relax, as objectively measured by frontalis EMG, during self-control relaxation attempts nor during the simulated stressful role plays. Three of the four subjects showed improvements in their ability to relax after training, but these values were sizable only for Subject 2. Although the absolute EMG values were not reported here, the mean EMG levels at rest were relatively low (range = 1.87 to 2.77 microvolts) across all subjects at both assessment periods. Such low levels of muscle tension may indicate that these subjects were capable of relaxing within this structured situation, but the assessment is inadequate for embracing the more relevant ability to relax in their natural environment. Despite the small changes in EMG, all subjects reported greater decreases in their STLs during the second assessment session, which suggests they achieved a more relaxed state. It is unknown if this self-report represents experimental demand or reflects inaccuracy of detecting small physiological changes. Had multiple assessments of longer duration been completed, a more accurate picture might have been evident.

More difficult to interpret is the finding that 3 of the 4 subjects evinced greater EMG reactivity during the second application assessment which implies that they did not learn to apply the skill. This, too, may represent a methodological problem. Physiological reactivity to

stressor tasks is perhaps best measured over repeated assessments. Although three role plays were used at each of two assessment phases, the reactivity differences observed may fall within the range of expected variability. It is also possible that the personally-relevant role plays of Session 2 were more challenging and consequently evoked greater arousal than Session 1. Again, additional assessments would have provided better measures of the acquisition and application of the relaxation skill. It is possible that the extensive applied focus of the treatment provided the strongest benefits within the subject's daily living situation and this was not captured within the brief and structured experimental setting.

Placebo responsiveness, experimental demand, and disease-specific factors are other possible explanations for the positive outcome. Subjects were provided with extensive information on the herpes virus and the rationale for treating recurrence rates with relaxation to ensure that they would accept the treatment as credible and to ensure compliance with applied practices. It is likely that this carried a demand component as well. Coupled with extensive therapist contact and the sophisticated equipment, these factors are all potential confounding variables.

Normal variability in outbreaks and the fact that

many herpes sufferers show decreases in the frequency of outbreaks over time may also account for the improvements obtained. This seems unlikely since most subjects had been diagnosed with the disease for many years and had shown a stable outbreak pattern up until treatment. Lengthy baselines also were recorded to accurately establish their frequency. It will be necessary to repeat this study with a no treatment group and a larger sample size to control for these influences.

The integrity and credibility of this type of treatment received strong support from these subjects as measured by the consumer satisfaction questionnaire. Subjects reported that they were satisfied with the high quality, appropriateness, and effectiveness of the treatment. Anecdotal comments further suggested that the benefits for the subjects generalized far beyond just controlling their herpes outbreaks. One subject reported that the program "literally changed my life." Subjects frequently provided examples of how they were able to use the skill to stay calmer in stressful situations at home and work.

A limitation of this study is the reliance on self-reports of herpes outbreaks. Despite the subjects' experience with the consistent and recurrent nature of this disease and the care taken in training them to make accurate recordings, it is possible that they

inaccurately reported outbreaks. Future research, especially as it attempts to determine the mechanisms of action for the hypothesized relaxation-immune system-recurrence change relationship, will need to obtain laboratory verification of outbreaks if a cause-effect relationship is to be established.

As has been shown in this and previous studies, not all subjects become symptom-free following relaxation treatment. Identifying the parameters of relaxation training with herpes sufferers such that relaxation is more potent in its effect would be a valuable research direction. Several areas of potential study include identifying the optimal frequency and length of training, generalizing of the skill to everyday settings, enhancements such as imagery, methods for increasing compliance, and depth of rationale. It seems likely that some herpes sufferers would respond to alternative treatments based on their individual needs. This study included a relatively homogeneous group of participants with the exception of Subject 2 (as described above), who responded least favorably. In some cases, where a variety of problems exist, a multicomponent approach may be the most beneficial. The treatment in this study occurred across 10 sessions. It is possible that an abbreviated version or training within a group format might produce equal and more cost-effective benefits.

That only subjects who did not take anti-viral medications were included in this study is also a promising finding. Nonetheless, combining relaxation training with medication may provide even greater advantages for some herpes sufferers especially during the first years after contracting the virus when the outbreaks and distress levels are most severe.

The process by which treatments such as relaxation impact changes in herpes activity is not known. A common component across many strategies may be in providing individuals with a specific coping skill for handling stress. Successful application of the skill may also lead to other healthy life-style changes which further modify the disease process. Relaxation involves lower general arousal, decreased muscle tension, increased peripheral blood flow, decreased sympathetic activity and adrenalin secretion, all of which may lead to changes in the immune system. This study was premised on the hypothesis that the immune system could be positively influenced through relaxation by as yet undetermined mechanisms and consequently result in reductions in herpes activity. A number of researchers have now demonstrated support for changes in immune system function following a wide variety of relaxation strategies (for a review see Halley, 1991). The relationship between stress and disease and stress and the immune system is fairly well

documented. What is not well researched are the changes observed in the immune system and the incidence of disease. Although no direct measures of this activity were obtained in this study, future HSV research employing these may have important implications for a variety of illnesses.

In summary, this study suggests that biobehavioral techniques presently available can have a bearing on health status. Applied Relaxation as examined in this research appears to be a useful tool for enabling herpes sufferers to effectively manage their recurrence rates.

Appendix A
Informed Consent

INFORMED CONSENT FOR PARTICIPATION IN AN INVESTIGATION

Psychologically-based interventions in the Treatment of Genital Herpes
Western Michigan University
Investigator: Kent Koehn, M.A.

I understand that I am being invited to participate in a research study entitled "Psychologically-based Interventions in the Treatment of Genital Herpes" to evaluate the effectiveness of such treatments to reduce recurrence rates in individuals suffering from frequent outbreaks.

As a participant in this research, I will be asked to sign a medical release of information form which will provide the researchers with my positive laboratory test results for the herpes virus. To be included in the research I must have contracted the virus at least one year prior to the study and have good general health. As a volunteer, I will be asked to refrain from taking herpes medications. Although I agree to do this, I am free to discontinue my research involvement without penalty and resume the medications.

Participation in this study involves completing four questionnaires which will take less than 30 minutes to complete. I will complete one of these questionnaires on a weekly basis throughout my participation. In addition to completing the questionnaires, I understand that I will also be required to complete brief daily diary recordings of the occurrence and severity of herpes outbreaks and daily stressors and illnesses. For inclusion in the study I understand that I must experience frequent occurrences as determined through these daily symptom reports. If I do not meet this criteria the researchers may choose not to include me in this study.

As a participant in this study, it will be necessary to maintain the daily diaries for a period of 2, 3, or 4 months prior to receiving treatment. I understand that I may be assigned to either of two treatments that have been shown to be helpful to herpes sufferers: Applied Relaxation or Brief Counseling. Applied Relaxation involves learning and using the skill of relaxation as means to more effectively deal with everyday stress. The focus of the Brief Counseling sessions will be to provide the opportunity to discuss factors contributing to the psychological difficulties associated with genital herpes. Both treatments require approximately 8 hours.

In addition to participating in the treatment, I will have my muscle tension monitored in 2 one-hour laboratory sessions during the study. During these sessions I will be asked to participate in three role play scenes during which my muscle tension will be measured. The role plays are designed to resemble stressful events commonly experienced in everyday life. Each role play will last no longer than 3 minutes and each will be separated with a rest period. An example of a role play might be refusing the unreasonable request of a door-to-door salesman. I understand that this research involves minimal risk to me. The equipment used to obtain the physiological measures and is painless and non-invasive.

I understand that my participation is voluntary. There is no cost to me other than my time nor is there any payment. A potential benefit of my receiving either relaxation skill training or Brief Counseling may be a reduction in the recurrences of herpes or in other stress-related problems.

I understand that as a participant I must meet the screening criteria described above. If I do not meet these criteria and am not included in the study my data and any identifying information will be destroyed.

I may withdraw my participation at any time without penalty.

Because the nature of some information obtained is highly personal it will be held in the strictest of confidence of the researchers. All researchers will sign a confidentiality form. All information gathered will be used for research purposes only and not identified by name. All data will be coded by numbers with the names removed to insure confidentiality. All questionnaires will be stored in a locked cabinet in the principle investigator's office. Name and number codings will be destroyed after analysis. I do understand that my research records, just like hospital records, may be subpoenaed by court order or may be inspected by federal regulatory authorities.

I understand that any questions or complaints I have now or at anytime in the future will be answered by contacting: Dr. M. Michele Burnette or Kent Koehn at 387-4489.

My signature below indicates that I have read and understood the above information and have decided to participate in the study.

Signature _____ Date _____ Time _____

Signature of Investigator _____

Appendix B
Daily Self-Monitoring Diary

Code Number: _____
 Date: _____

Do you currently have a clearly visible herpes sore? yes no

If you have more than one active site please circle the number: 2 3 4 5

Do you currently have symptoms of a herpes sore that are not visible? yes no

If relevant, give an average symptom rating on the following dimensions:

PAIN:

no pain	mild	moderate	severe	very severe pain
0	1	2	3	4

ITCHING OR TINGLING:

no itching	mild	moderate	severe	very severe itching
0	1	2	3	4

OTHER SYMPTOM: (name) _____

not present	mild	moderate	severe	very severe
0	1	2	3	4

OTHER SYMPTOM: (name) _____

not present	mild	moderate	severe	very severe
0	1	2	3	4

PRESENCE OF SORE:

not visible				very visible
0	1	2	3	4

EMOTIONAL EFFECT:

no distress	mild	moderate	severe	extreme distress
0	1	2	3	4

LIST ANY MAJOR LIFE EVENT THAT OCCURRED TODAY. _____

Rate the amount you were **distressed** by this event.

no distress	mild	moderate	severe	extreme distress
0	1	2	3	4

OVERALL, HOW **STRESSED** WERE YOU TODAY?

not at all	mildly	moderately	severely	extremely
0	1	2	3	4

OVERALL, HOW WELL DID YOU **COPE** WITH STRESS TODAY?

not at all	somewhat	moderately	well	extremely well
0	1	2	3	4

PLEASE RECORD ANY **ILLNESSES** YOU HAD TODAY _____

PLEASE RECORD ANY **HERPES MEDICATIONS** YOU TOOK TODAY _____

RELAXATION PRACTICES

When _____

For how long _____

Score before _____ (rate on scale of 0-100. 0 =totally relaxed,

Score after _____ 50 = normal, 100 = maximum tension)

COMMENTS:

Appendix C
Applied Relaxation Training for Genital
Herpes Training Protocol

APPLIED RELAXATION TREATMENT MANUAL FOR GENITAL HERPES
Kent A. Koehn

Pretreatment

Clients should be asked to record their daily herpes activity on the provided diary forms. Once a day, preferably at the same time, they should complete the forms.

TREATMENT SESSION # 1

1. Discuss appointment schedule with subject. There will be a total of 10 treatment sessions spread over 5 weeks. Sessions will be held twice per week. Each session will last approximately 45 to 60 minutes. The post-treatment evaluation will take place approximately 2 weeks after the last treatment session and will last about 1 hour.

Discuss and resolve any conflicts with schedule, e.g., vacations in middle of treatment, etc.

2. Remind the subject of the importance of keeping daily records of their herpes activity throughout treatment, and for the 6-month post-treatment period.

Purpose: Provides information of herpes symptoms, their severity and frequency, and stressful events to be discussed during the sessions. Discussion may include the symptoms of stress from work/home. Records will also be used in determining treatment effectiveness.

4. Provide educational information to the subject. The purpose of this education is to provide the conceptualization that the problem of genital herpes recurrences may be related to changes in the body's immune system function or to stress or physical trauma.

The immune system is the body's defense mechanism against invading viruses such as herpes. When a virus intrudes, the immune system is activated in multiple ways. Lymphocytes or T-cells become warriors that go forth into the diseased areas and consume the infected cells. B-lymphocytes produce antibodies to fight specific invaders. When viral or bacterial invaders are discovered in the body, the body begins to produce lymphocytes to fight the infection. Swollen glands are actually engorged lymph nodes that have been stimulated into such action. Another form of bodily defense is known as cell-mediated immunity. Phagocytes and macrophages of the cell-mediated system, like the lymphocytes, are white blood cells that consume the infected cells. There are other immune system activities as well that help defend the body from infection. Variances in the immune system may result in wide differences seen in the symptoms, their duration, and severity across different persons. It is also believed that there are hundreds, or thousands of separate herpes virus strains. It is likely that some viruses are exceptionally weak and may cause only mild attacks. Others may be very strong and produce more severe attacks. Once contracted the herpes virus migrate to a cluster of nerve roots in the lumbro-sacral ganglion (base of the spine) in

genital herpes. In oral herpes infections the virus travels to the nerve roots in the upper cheek. Once in the ganglia, they lie dormant. They do not replicate here. They are simply peaceful until reactivated. The immune system is designed to seek out and destroy only active foreign bodies so the dormant herpes virus simply remains completely harmless until reactivated. Moreover, since it resides in the nervous system which has very sophisticated defenses, even antibodies that might go after the herpes virus may not be able to penetrate. Periodically, the virus will retrace the nerve pathway and develop into a lesion on the skin. What stimulates the latent virus is not known. It is believed that the herpes virus is constantly monitoring the host's immune system. When the body's defenses deteriorate for any reason, e.g. illness, fatigue, stress, the viral particles launch an attack. Others speculate that the virus lies inactive until the nerve root cells are stimulated, e.g., by chronic physiological arousal, and the virus again travels down the nerve cells to the skin where it reproduces and a sore develops as a result of the body's defenses fighting with it. The virus then is acting as if stress or illness in its host is the sign of danger to find a new and healthier host. "Stress" can result in the arousal of the autonomic nervous system and subsequently effect the immune system. Such arousal includes muscles tensing, blood vessels constricting, and heart rate increasing. It is our hypothesis that maintaining a healthy immune system through reducing physiological arousal will result in fewer herpes recurrences.

5. Provide treatment rationale.

This treatment program is designed to teach you skills to deal more effectively with the stress you experience in everyday living situations. You will be taught to physically relax your body through applied relaxation. As a result of the relaxation training you will become more aware of both the tension in your body and the events or situations that contribute to it. Stressful situations may include having a difficult day at work/home, an argument with someone, having too many tasks to do, etc. When a person encounters such a situation there are 3 different components to his/her reaction: a physiological (increased heart rate, blood pressure, etc.), a behavioral (escaping or avoiding it), and a subjective (negative thoughts like "I can't do this", "This is awful", or "This is unpleasant, I don't like it"). The strength of these components varies between persons, but previous research has found that most people experience some physiological change first.

We are going to focus on the physiological reactions and learn not to react so strongly. The method we are going to use to achieve this is called applied relaxation. The aim

of this technique is to learn a skill of relaxation, which can be applied very rapidly and in practically any situation. Applied relaxation has been shown to be effective for a variety of problems: tension and migraine headaches, pain, epilepsy, panic disorder, and gastric problems. This is a skill just like any other skill, e.g., learning to ride a bike, drive a car, or talk with others, in that it takes time and practice to learn, but once you have mastered it you can use it anywhere. You are not restricted to the calm, and non-stressful situation of your office or your own home.

The goal is to be able to relax in 20-30 seconds and to use this skill to counteract and eventually get rid of, the physiological reactions you usually experience in stressful situations. To achieve this we are going through a gradual process starting with tensing and relaxing different muscle groups. This takes about 15 minutes, and you are to practice it twice a day. Then we start to reduce the time it takes to relax by taking the tension part away, just relaxing, which takes 5-7 minutes. The next step teaches you to connect the self-instruction "calm" to the bodily state of relaxation. Then we teach you to do different things while still being relaxed in the rest of your body, and also relaxing while standing and walking. After that it is time for the rapid relaxation, which you practice many times a day in non-stressful situations. Finally, you reach the stage of applying the skill to stressful situations, and we will have you engage in different anxiety-provoking situations while coaching you how to apply the relaxation at the first signs of anxiety in these situations. Applied relaxation is thus a skill that most people can acquire with the right instructions and a lot of practice. It is a "portable" skill that can be used in almost any situation e.g., when having problems in falling asleep, having headaches, or bowel distress.

The purpose of applied relaxation is: (1) teaching you to recognize early signs of anxiety and tension, and (2) learning to cope with the anxiety or tension instead of being overwhelmed by it.

Inform the subject that in the next session they will be asked to briefly role play a scene in which they tell an interested friend about the treatment and how it works to reduce their herpes activity.

6. Discuss the potential outcome with the subject. A reduction in herpes activity is expected. This will be defined on an individual basis. The subject should not expect to see changes in their herpes outbreaks for several weeks, until they have learned and began daily practice of the skill. It is important for the subject not to be

discouraged if there is not immediate relief. Improvement occurs slowly, this is not a quick or magical solution to their problems.

7. Recognizing the early anxiety signals.

The subject is then given a homework assignment to self-observe and record their initial anxiety-reactions. Examples of early anxiety signals are increases in heart rate, tension in shoulders, neck, forehead, trembling, butterflies in stomach, etc. Do a brief behavior analysis of such a situation involving the antecedent events, their reaction (focused on physiological) and the consequences (e.g., escape, such as quitting/giving in, or avoidances, such as avoiding person).

8. Questions.

9. Remind of homework assignment. Subject should prepare to give rationale in role play form and to record an anxiety-provoking incident and their reaction.

TREATMENT SESSION # 2

1. Check the homework assignment of anxiety-reaction to stressful incident. Troubleshoot any diary recording problems and encourage them to continue to use them.

2. Have the subject role play explaining applied relaxation and the rationale for its use to reduce herpes activity. Review the rationale: 1. to identify early signals of anxiety and 2. learn to cope with the anxiety, with the result of reducing overall tension level in the body which will result in decreased symptomatology.

3. Introduce relaxation training. The relaxation training consists of the systematic tensing and relaxing of the major muscle groups of the body. During the tension-release cycle it is important to pay attention to the sensations experienced. Tensing the muscles first will serve to exaggerate the "releasing" of the tension, therefore emphasizing this response and also gives you a "running start" to achieve the relaxation response. After going through this series of tension-release cycles, you should feel quite relaxed. Learning to relax is a skill, like learning to ride a bicycle, driving a car, learning to swim, etc. With regular practice you become better at it. It is recommended that you practice at least twice a day.

Demonstrate the 16 muscle groups for the patient. Remind them to pay attention to the sensation of relaxation they will feel, and to follow the verbal instructions you give them. Have the subject close his/her eyes and assume a comfortable position in the chair. Have the subject remove glasses and loosen tight clothing.

4. Progressive muscle relaxation training. Begin the training as described in Bernstein and Borkovec's (1973) Progressive Muscle Relaxation Training manual. Obtain a SUDS tension rating: 0 = completely relaxed, 50 = normal, 100 = maximum tension.

16 muscle groups are tensed and relaxed successively. 2 repetitions per muscle group. Tense for 5-7 seconds and release and relaxation for 30-40 seconds.

- 1) right hand and forearm
- 2) right biceps
- 3) left hand and forearm
- 4) left biceps
- 5) forehead and scalp
- 6) eyes, cheeks
- 7) mouth, jaw
- 8) neck
- 9) shoulders and back

- 10) chest and stomach
- 11) right thigh
- 12) right calf and shin
- 13) right ankle and foot
- 14) left thigh
- 15) left calf and shin
- 16) left ankle and foot

5. Homework assignment is given. The subject is instructed to practice twice a day, preferably morning and night, and record the practice on their daily diary form. Provide a pre- and post-relaxation SUDS tension ratings on the 0-100 scale where 0 = completely relaxed, 50 = normal, 100 = maximum tension). Also record when and for how long they practiced. Emphasize the importance of the home practice. Set next appointment.

6. Sign contract for relaxation practices.

TREATMENT SESSION # 3

1. Inquire as to the success of relaxation practice at home. If problems, troubleshoot. Relate identifying tension reaction in stressful situations.
2. Practice 16 muscle groups. Obtain a pre and post SUDS rating.
3. Encourage home practice and recording and set next appointment.

TREATMENT SESSION # 4

1. Inquire about home practice.
2. Practice 7 muscle groups.
 - 1) dominant arm
 - 2) nondominant arm
 - 3) facial muscles
 - 4) neck and throat
 - 5) chest, shoulders, back, and abdomen
 - 6) dominant thigh, shin/calf, and foot
 - 7) nondominant thigh, shin/calf, and foot
3. Encourage need to practice. Set next appointment

TREATMENT SESSION # 5

1. Inquire about home practice.
2. Introduce release-only relaxation.

The purpose of this phase is to reduce the time it takes the patient to become relaxed, from 20-45 minutes to 5-7 minutes. Instead of asking the subject to tense the different muscle groups, the therapist instructs the subject to relax these muscles directly. Proceed with the regular exercise by going through each of the 16 muscle groups and have the subject recall the feelings associated with the release of tension. Obtain SUDS ratings pre and post training.
3. Encourage home practice of release-only relaxation and set next appointment.

TREATMENT SESSION # 6

1. Inquire about home practice.

2. Introduce cue-controlled relaxation.

The purpose of cue-controlled relaxation is to create a conditioning between the self-instruction "relax" and the state of being relaxed, which is relatively easy once the subject starts out by relaxing before the conditioning begins. The focus is on the breathing. The session starts with the subject relaxing using the release-only relaxation and signalling the trainer when s/he has achieved a state of deep relaxation. When this is done, the trainer gives the following instruction cued to the subject's breathing pattern. Just before the inhalation the trainer says "INHALE" just before the exhalation "calm." This is done 5 times and then the subject is instructed to think "inhale" and "calm", respectively, in relation to the breaths. After about 1 minute the trainer once more instructs "INHALE..CALM" 4-5 times, and then the subject continues on his/her own a couple of minutes. The cue-controlled relaxation cycle is repeated once more during the session after an interval of 10-15 minutes.

3. Questions, encourage home practice, and set next appointment.

TREATMENT SESSION # 7

1. Review home practice.

2. Introduce differential relaxation.

In order for applied relaxation to be an efficient coping skill it must be "portable", i.e., the subject should be able to use it in practically any situation. The primary purpose of differential relaxation is teaching the subject to relax in other situations, besides the armchair, etc. The secondary purpose is to teach the subject not to tense the muscles that are not being used for the particular bodily activity that the subject is engaged in at the moment.

Obtain a SUDS rating and then begin the session with letting the subject relax by using cue-controlled relaxation, i.e., relaxing from head to foot, scanning the body for any tensions, while sitting in the armchair. Then s/he is instructed to do certain movements with various parts of the body, frequently scanning it for signs of tension. Have them open their eyes and look around the room but only move their eyes; looking around and also moving the head; lifting one hand; one arm, and then the other; lifting one foot, one leg, and then the other; bending at the waist by leaning forward, lean to the left, lean to the right, tilting head backwards, lifting a small object. While giving these instructions the trainer should continuously encourage the subject to relax the parts of the body that are not engaged in the movement. This is particularly important when it comes to the arms and legs. Probe for any problematic areas.

Next, the same practice is done while sitting on an ordinary chair, and then sitting by a desk writing on a piece of paper, or talking on the telephone. Then practice to relax while standing, and while walking. While practicing standing, have the subject stand close to the wall because they may feel an unsteadiness. When practicing walking emphasize the muscles that are not involved in walking.

3. Encourage home practice of differential relaxation and set next appointment.

TREATMENT SESSION # 8

1. Inquire about differential relaxation home practice.

2. Introduce Rapid relaxation.

This phase has two purposes: (1) teaching the subject to relax in natural non-stressful settings, and (2) further reduce the time it takes to get relaxed; the goal being 20-30 seconds.

To achieve this goal the subject should relax 15-20 times a day in a natural situations. Probe the subject about what would serve as a cue for relaxation training. Examples of such cues: every time look at their watch, making a telephone call, opening a cupboard, the color blue, license plates, etc. To increase the signal-value one can put a small piece of colored tape on the watch or the telephone receiver.

Begin and end the session with a SUDS rating. Then while relaxing in these situations the subject is instructed to do the following: (1) take 1-3 deep breaths and slowly exhale (2) think "calm" before each exhalation, and (3) scan the body for tension and try to relax as much as possible in the situation at hand.

The subject may pick out certain times a day when stressed and use cue-controlled relaxation.

3. Encourage home practice of rapid and cue-controlled relaxation. Set next appointment.

TREATMENT SESSION # 9

1. Inquire about home practice of rapid relaxation.

2. Introduce Application training.

This involves applying the relaxation skill in natural situations to cope with anxiety. Remind the subject that relaxation is a skill and it takes practice to get refined. Introduce counter-demand and not to become discouraged if it does not appear to work well initially and to continue to practice in these settings. Relatively soon the subject will notice a larger effect of applied relaxation and eventually the tension reaction can be aborted altogether.

The purpose of this phase is to show the subject that s/he can cope with the anxiety experienced and eventually abort it altogether. During the remaining two sessions the trainer is very much like a sports coach, encouraging the subject to relax before entering the situation, to observe the initial physiological reactions, and to counteract these by using relaxation in the situation to stop the anxiety from increasing further.

Obtain a SUDS rating prior to and after each task.

Use the following situations:

a. hyperventilation: Have the subject hyperventilate by taking rapid and deep breaths for 90 seconds.

b. physical exercise: have the subject ride the exercise bike for 3 minutes.

c. imagery: have the subject imagine a anxiety-provoking situation.

d. mental arithmetic: have the subject count backwards from 100 by 7's.

e. role plays: have the subject engage in a brief role play e.g., interviewing for a job.

3. Encourage the subject to practice the applied relaxation in stressful situations at home/work. Set final training appointment.

TREATMENT SESSION # 10

1. Inquire about home practice.
2. Repeat session 9 applied training.

3. Introduce maintenance program.

It is important to keep practicing as with any skill. After training the skill must be practiced in order not to forget or get rusty. Encourage the subject to develop the habit of scanning the body at least once a day, and if noticing any tension, use the rapid relaxation to get rid of it. S/he should also practice the differential or rapid relaxation twice a week on a regular basis. Furthermore, the subject is to be reminded that no treatment can inoculate against anxiety reactions in the future, and to be prepared that a setback can occur at any time, after a long anxiety-free period. Suggest that a setback in their herpes activity may be seen as a good thing, an opportunity to practice applied relaxation. Inform them that they are to continue to complete the daily diaries and to mark the relaxation skills that they practiced that day.

4. Encourage further practice. Set a date for the post-treatment assessment session.

Appendix D
Consumer Satisfaction Questionnaire

Consumer Satisfaction Questionnaire

1. How would you rate the quality of the training you received?

Poor					Excellent
1	2	3	4	5	

2. Has the training you received helped you to deal more effectively with your herpes?

Not at all				Very much
1	2	3	4	5

3. To what extent has the training met your needs?

Not very much				Very much
1	2	3	4	5

4. I feel the approach to reducing herpes recurrences by using this type of training is:

Very inappropriate				Very appropriate
1	2	3	4	5

5. Would you recommend our program to other herpes sufferers?

Strongly not recommend				Strongly recommend
1	2	3	4	5

6. Overall, how satisfied are you with the training you received?

Very unsatisfied				Very satisfied
1	2	3	4	5

Appendix E
Human Subjects Review Board Approval

Human Subjects Institutional Review Board



Kalamazoo, Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: April 2, 1990

To: Kent A. Koehn

From: Mary Anne Bunda, Chair *Mary Anne Bunda*

This letter will serve as confirmation that your research protocol, "Applied Relaxation in the Treatment of Genital Herpes", has been approved as full by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: M. Burnette, Psychology

HSIRB Project Number 90-03-07Approval Termination April 2, 1990

Appendix F
Laboratory Assessment Instruction

CODE:

SESSION:

INSTRUCTIONS

General preparatory statements: "Throughout the experiment we will be obtaining physiological measurements while we ask you to do several things-- attempt to relax and to engage three roleplay interactions. Each roleplay will be preceded and followed by a baseline/rest period. The session will last about 45 minutes and we will give you instructions over the intercom prior to each phase. We ask that you do not talk with the experimenters until the end of the session. Any questions?"

Adaptation phase: "This is the adaptation phase, I would like you to sit quietly for approximately 10 minutes."

Baseline phase: "This is a baseline phase, please sit quietly, this phase will last approximately 3 minutes."

Self-control relaxation: "In this next phase I will ask you to relax. Before we begin, I would like you to give me a rating of your level of muscle tension on a 0 to 100 scale where 0 represents totally relaxed, 50 = normal and 100 = maximum tension. (Obtain pre-SUDS value _____). When I say begin, please attempt to become as relaxed as you can using whatever method you choose. The phase will last approximately 10 minutes. Begin."

At end of interval: "Okay, stop. Please give me another rating of your level of muscle tension on the same 0 to 100 scale". (Obtain post-SUDS value _____).

Baseline phase: "This is a baseline phase, please sit quietly, this phase will last approximately 3 minutes."

Roleplay 1: "During this phase I will read to you a description of a potentially stressful event. An actor will briefly roleplay this situation with you. I would like you to respond to this person as you normally would in such a situation. You are not being evaluated on your acting ability and there is no right or wrong way of responding. Please continue your interaction with the actor until I say stop. Now here is the situation...."

Baseline phase: "This is a baseline phase, please sit quietly, this phase will last approximately 3 minutes".

Roleplay 2: "This is phase will be the second roleplay. Here is the situation..."

Baseline phase: "This is a baseline phase, please sit quietly, this phase will last approximately 3 minutes".

Roleplay 3: "This is phase will be the last roleplay. Here is the situation..."

Appendix G
Tables and Figures

Table 1
Subject Characteristics

Sub- ject	Age	Sex	Marital Status	Race	Educa- tion	When Diagnosed	No. out- breaks prior 1 yr.
1	21	F	M	W	college	1987	10-12
2	31	F	M	W	college	1978	7-9
3	41	F	S	W	H.S.	1989	12+
4	41	F	D	W	college	1983	10

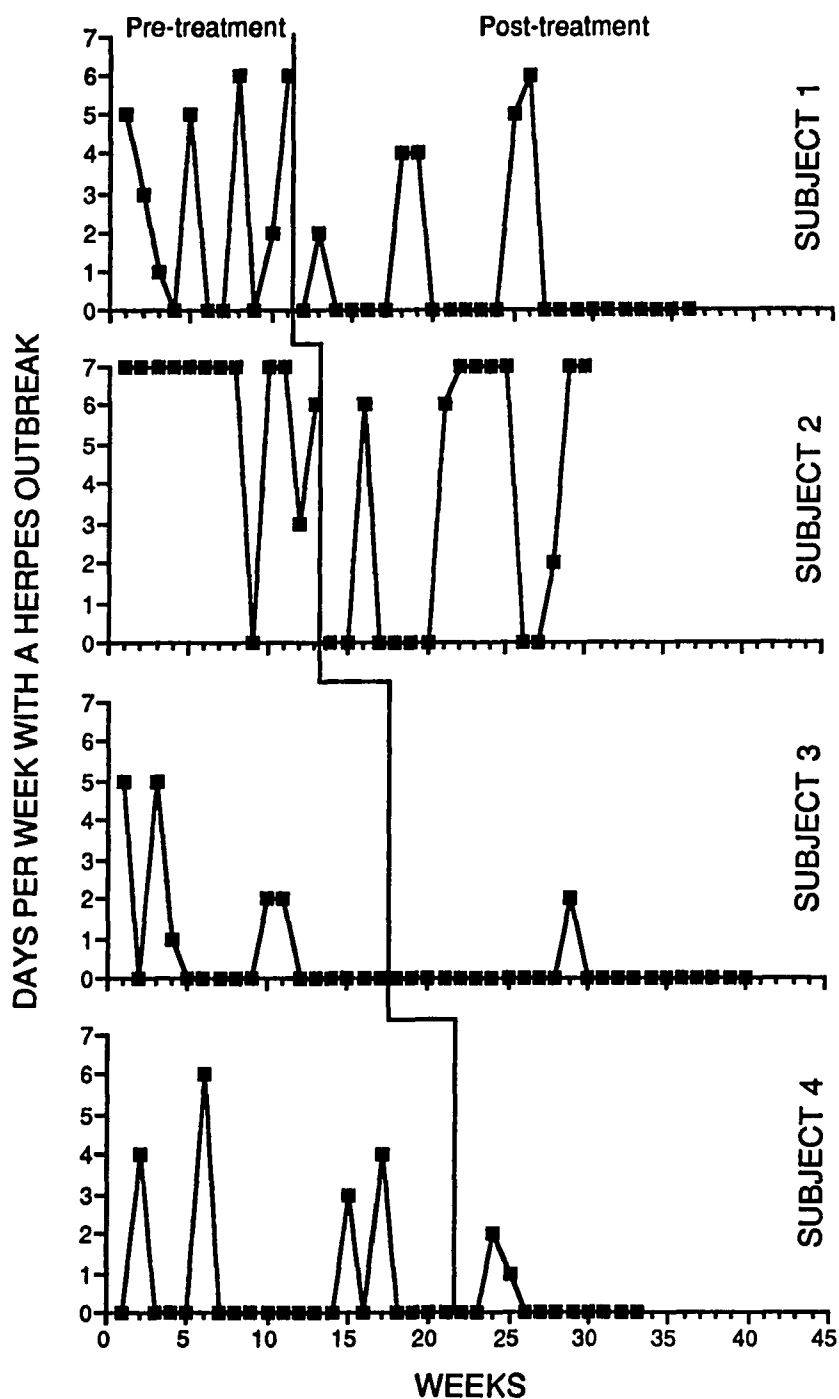


Figure 1. Days per Week With an Outbreak for Each Subject.

Table 2

Mean Days Per Week With a Herpes Outbreak and
Percent Change Across Pre- and Post-
Treatment for Each Subject

Subject	Mean Days Pre-	Mean Days Post-	t Statistic	Frequency Percent Decrease
1	2.55	0.84	2.29*	67
2	6.08	3.29	2.57*	46
3	0.88	0.09	2.09*	90
4	0.81	0.25	1.21	69

Note. * $p < .05$

Table 3

Mean Duration of Herpes Outbreaks and Percent Change
Across Pre- and Post-Treatment for Each Subject

Subject	Mean Days Pre-	Duration Post-	Duration Percent Decrease
1	5.6	5.3	5
2	19.8	18.7	6
3	5.0	2.0	60
4	4.3	3.0	30

Table 4

Mean Pre- and Post-Session Subjective Tension Levels Across
Training and Mean Number of Days per Week Subject Used
Relaxation Skill After Training

Subject	STL Mean Pre-	STL Mean Post-	Percent Decrease	Mean Relaxation Use
1	53.57	35.00	35	3.4
2	57.85	14.29	75	2.5
3	69.14	19.29	72	4.6
4	59.33	11.67	80	4.4

Note. STL = subjective tension level.

Table 5

Within Session Percentage Change in EMG and STL Measures
From Minute 1 to Minute 10 of Self-Control Relaxation
Phase and Overall Difference Scores

Self-Control Relaxation Evaluations			
Subject	Pre-	Post-	Difference Score
<u>EMG</u>			
1	-40	-53	- 13
2	-13	-68	- 53
3	-36	48	+ 84
4	-14	-25	- 11
<u>STL</u>			
1	-20	- 22	- 2
2	-50	- 80	- 30
3	0	- 56	- 56
4	-50	-100	- 50

Note. EMG = electromyographic activity, STL = subjective tension levels.

Table 6

Mean Percentage Change in EMG (reactivity) Across Pre-
and Post-training Role Play Application Phases

Subject	Application Evaluations	
	Pre-training	Post-training
	<u>EMG</u>	
1	170.0	51.0
2	68.7	137.6*
3	147.0	252.0*
4	95.0	201.3*

Note. EMG = electromyographic activity. * represents an EMG percentage increase over pretraining level.

Table 7
Summary of Mean Psychosocial Scores
at Pre- and 3-Months Post-Training

Measures	Subject							
	1		2		3		4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
SCL-90-R								
GSI	.27	.01	.72	.51	.16	.30	.44	.29
STAI								
State	33	24	54*	43	32	30	41	27
Trait	31	29	53*	45	32	25	34	30
Beck	1	0	18*	10	3	9	9	6
MHLC								
IHLC	27	28	25	30	25	24	32	33
POLC	12	10	21	14	6	10	10	9
CHLC	17	20	18	14	23	14	13	16

Note. SCL-90-R = Symptom Checklist Revised, STAI = State-Trait Anxiety Inventory, Beck = Beck Depression Inventory, MHLC = Multidimensional Health Locus of Control, IHLC = internality of health locus of control, POLC = powerful other locus of control, CHLC = chance locus of control. * indicates 93rd and 94th percentile rankings on STAI and severe depression on BDI.

BIBLIOGRAPHY

- Ashley, R. L., & Corey, L. (1984). Effect of acyclovir treatment of primary genital herpes on the antibody response to herpes simplex virus. Journal of Clinical Investigations, 73, 681-688.
- Beck, A. T., Ward, C. H., Mendelsohn, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 561-571.
- Bernstein, D. A., & Borkovec, T. D. (1973). Progressive muscle relaxation. Champaign, IL: Research Press.
- Bierman, S. M. (1983). A possible psychoneuroimmunological basis for recurrent genital herpes simplex. Western Journal of Medicine, 139, 547-552.
- Burnette, M. M., Koehn, K. A., Kenyon-Jump, R., Hutton, K. A., & Stark, C. (1991). Control of herpes recurrences using progressive muscle relaxation. Behavior Therapy, 22, 237-247.
- Centers for Disease Control (1982). Genital Herpes infections--United States, 1966-1979. Morbidity Mortality Weekly Report, 31, 137-139.
- Chang-Liang, R., & Denney, D. R. (1976). Applied relaxation as training in self-control. Journal of Counseling Psychology, 23, 183-189.
- Deffenbacher, J. L. (1976). Relaxation in-vivo in the treatment of test anxiety. Journal of Behaviour Therapy and Experimental Psychiatry, 7, 289-292.
- Derogatis, L. R. (1977). The SCL-90-Revised, Manual I. Baltimore: Johns Hopkins University.
- Douglas, J. M., Critchlow, M. S., Benedetti, J., Mertz, G. J., Connor, J. D., Hintz, M. A., Fahnlander, A., Remington, M., Winter, C., & Corey, L. (1984). A double-blind study of oral acyclovir for suppression of recurrences of genital herpes simplex virus infection. New England Journal of Medicine, 310, 1551-1556.

- Drob, S. (1985). Psychotherapy with patients suffering from genital herpes. Psychotherapy in Private Practice, 3, 129-137.
- Drob, S., & Bernard, H. (1985). Two models of brief group psychotherapy for herpes sufferers. Group, 9, 14-20.
- Drob, S., Bernard, H., Lifshutz, H., & Nierenberg, A. (1986). Brief group psychotherapy for herpes patients: A preliminary study. Behavior Therapy, 17, 229-238.
- Goldmeier, D., & Johnson, A. (1982). Does psychiatric illness affect the recurrence rate of genital herpes? British Journal of Venereal Disease, 54, 40-43.
- Gould, S. S., & Tissler, D. M. (1984). The use of hypnosis in the treatment of herpes simplex II. American Journal of Clinical Hypnosis, 26, 171-174.
- Gruchow, W. H. (1979). Catecholamine activity and infectious disease episodes. Journal of Human Stress, 5, 11-17.
- Guinan, M. E. (1986). Oral acyclovir for treatment and suppression of genital herpes simplex virus infection. Journal of the American Medical Association, 255, 1747-1749.
- Halley, F. M. (1991). Self-regulation of the immune system through biobehavioral strategies. Biofeedback and Self-Regulation, 16, 55-73.
- Holmberg, S. D., Stewart, J. A., & Gerber, A. R. (1988). Prior herpes simplex virus type 2 infection as a risk factor for HIV infection. Journal of the American Medical Association, 259, 1048-1050.
- Johnson, R. E., Nahmias, A. J., Magder, L. S., Lee, F. K., Brooks, C. A., & Snowden, C. B. (1989). A seroepidemiologic survey of the prevalence of herpes simplex virus type 2 infection in the United States. New England Journal of Medicine, 321, 7-12.
- Josey, W. E., Nahmias, A. J., & Naib, Z. M. (1976). Viruses and cancer of the lower genital tract. Cancer, 38, 526-533.
- Kanner, A. D., Coyne, J. C., Schaefer, C., & Lazarus, R. (1981). Comparison of two modes of stress

- measurement: Daily hassles and uplifts versus major life events. Journal of Behavioral Medicine, 4, 1-39.
- Kazdin, A. E. (1980). Behavior modification in applied settings (2nd ed.). Homewood, IL: Dorsey.
- Kemeny, M., Cohen, F., Zegans, L., & Conant, M. A. (1989). Psychological and immunological predictors of genital herpes recurrence. Psychosomatic Medicine, 51, 195-208.
- King, N. J. (1980). The therapeutic utility of abbreviated progressive relaxation: A critical review with implications for clinical practice. In M. Hersen, R. Eisler, & P. Miller (Eds.), Progress in behavior modification: (Vol. 10, pp. 147-182). New York: Academic Press.
- Larsson B., & Melin, L. (1986). Chronic headache in adolescents: Treatment in a school setting with relaxation training as compared to information-contact and self-registration. Pain, 25, 325-336.
- Linton, S., & Gotestam, K. G. (1984). A controlled study of the effects applied relaxation and applied relaxation plus operant procedures in the regulation of chronic pain. British Journal of Clinical Psychology, 23, 291-299.
- Longo, D. J., & Clum, G. A. (1989). Psychosocial factors affecting genital herpes recurrences: Linear vs. mediating models. Journal of Psychosomatic Research, 33, 161-166.
- Longo, D. J., Clum, G. A., & Yaeger, N. J. (1988). Psychosocial treatment for genital herpes. Journal of Consulting and Clinical Psychology, 56, 61-66.
- Lynch, J. M. (1982). Helping patients through the recurring nightmare of herpes. Nursing, 12, 52-57.
- McLarnon, L. D., & Kaloupek, D. G. (1988). Psychological investigation of genital herpes recurrence: Prospective assessment and cognitive-behavioral intervention for a chronic physical disorder. Health Psychology, 7, 231-249.
- Nahmias, A. J., & Visintine, A. M. (1976). Herpes simplex. In J. S. Remington & J. O. Klein (Eds.), Infectious diseases of the fetus and newborn (pp. 156-

- 190). Philadelphia: W. B. Saunders.
- Ost, L. G. (1987). Applied relaxation: Description of a coping technique and review of controlled studies. Behaviour Research and Therapy, 25, 397-409.
- Ost, L. G. (1988). Applied relaxation vs. progressive relaxation in the treatment of panic disorder. Behaviour Research and Therapy, 26, 13-22.
- Silver, P. S., Auerbach, S. M., Vishniavsky, N., & Kaplowitz, L. G. (1986). Psychological factors in recurrent genital herpes infection: Stress, coping style, social support, emotional dysfunction, and symptom recurrence. Journal of Psychosomatic Research, 30, 163-171.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). Manual for the state-trait anxiety inventory. New York: Consulting Psychologist Press.
- Stout, C. W., & Bloom, L. J. (1982). Type A behavior and upper respiratory infections. Journal of Human Stress, 8, 4-7.
- Straus, S. E., Croen, K. D., Sawyer, M. H., Freifeld, A. G., Felser, J. M., Dale, J. K., Smith, H. A., Hallahan, C., Lehrman, S. (1988). Acyclovir suppression of frequently recurring genital herpes. Journal of the American Medical Association, 260, 2227-2230.
- Surman, O. S., & Crumpacker, C. (1987). Psychological aspects of herpes simplex viral infections: Report of six cases. American Journal of Clinical Hypnosis, 2, 125-131.
- Taylor, B. J. (1979). The psychological and behavioral effects of genital herpes in women (Doctoral dissertation, University of Washington, 1978). Dissertation Abstracts International, 39, 2529B-2530B. (University Microfilms No. 79-20,779).
- VanderPlate, C., & Aral, S. O. (1987). Psychosocial aspects of genital herpes virus infection. Health Psychology, 6, 57-72.
- VanderPlate, C., Aral, S. O., & Madger, L. (1988). The relationship among genital herpes simplex virus, stress, and social support. Health Psychology, 7, 159-168.

- VanderPlate, C., & Kerrick, G. (1985). Stress reduction treatment of severe recurrent genital herpes virus. Biofeedback and Self-Regulation, 10, 181-188.
- Wallston, K. A., Wallston, B. S., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. Health Education Monographs, 6, 160-170.
- Watson, D. (1983). The relationship of genital herpes and life stress as moderated by locus of control and social support. Unpublished manuscript, University of Southern California, Long Beach.