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Nutrition, Fitness, Stress and Genital Herpes Recurrences

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NUTRITION, FITNESS, STRESS AND GENITAL HERPES RECURRENCES

by

Carman E. Stark

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 1994
NUTRITION, FITNESS, STRESS AND GENITAL HERPES RECURRENCES

Carman E. Stark, Ph.D.
Western Michigan University, 1994

The purpose of this research was to extend the existing literature by assessing the relationship between several factors separately and combined, nutrition, fitness and stress, and herpes recurrence rates. It was hypothesized that the results from this study would indicate an inverse correlation between nutrition, fitness, and genital herpes recurrence rates and a positive correlation between stress and genital herpes. Each participant was asked to complete and return (a) two Computerized Nutrition Assessment Forms that provide a health history profile and a record of food choices and portions over two, three-day periods; (b) The Hassle Scale that provides a weekly measure of self-reported stress level over a 12-week period; and (c) a Daily Log that provides a daily record of herpes outbreaks, severity and/or symptoms over a 12-week period. In addition, each participant was asked to participate in a fitness test. The results indicated that: nutrition, fitness and stress, assessed combined and separately, did not predict the recurrence rates of genital herpes for the participants in this study. In fact, when comparing scores obtained from the fitness testing and the stress inventory with recurrence rates data, the trend was slightly in the opposite direction than that hypothesized. However, when these data were plotted individually, 5 of the 29 participants demonstrated high stress severity concurrent with high genital herpes recurrence rates.
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CHAPTER I

INTRODUCTION

Review of the Literature

Genital herpes simplex virus (HSV) infection, a sexually transmitted and incurable disease, has been reported as a major personal and public health problem affecting as many as 20 million Americans (Center for Disease Control, 1982). Early estimates have predicted initial occurrence rates at 500,000 per year (Perlow & Perlow, 1983). A survey reported in 1989 suggested that the prevalence rate may actually be higher due to recent advancements in medical technology for virus detection. It is estimated that between 1976 and 1980 as many as 31 million Americans were infected with genital herpes (Johnson, Nahmias, Magder, Lee, Brooks, & Snowden, 1989).

The herpes virus usually generates multiple, small, grouped vesicular lesions that eventually become ulcerative, on and around the genital area. These lesions are frequently associated with pain, itching, swollen lymph glands, fever, muscle aches, painful urination, vaginal discharge, and malaise (Freudberg, 1982). Once acquired, HSV resides in the nerve cells of the sacral ganglia from where it can trigger recurrence of lesions (Juel-Jensen, 1973). Although recurrence rates tend to differ individually from frequent to not at all, it is estimated that those who have contracted genital herpes experience an average of four outbreaks per year (Himell, 1981). An assortment of biochemical and physical stressors such as coital friction, chafing, illness, overexertion and fatigue are believed to play an influential role in the activation of recurrent genital herpes (Bierman, 1983; Lynch, 1982).
Various reports have suggested that a large number of individuals who suffer from genital herpes endure problems related to psychological adjustment to the disease. A survey of over 3000 individuals with genital herpes by the American Social Health Association (ASHA) revealed that around 70% of respondents endorsed a sense of isolation and 84% associated periodic episodes of depression with the disease (ASHA, 1981). Drob, Loemer, and Lifshutz (1985) have indicated similar findings that suggest some genital herpes sufferers fear rejection by others, experience social isolation, and tend to sustain a view of themselves and the disease that is extremely negative, overly magnified, or faulty in content. Mann and Sandler (1984) examined the manner in which individuals deal with genital herpes and observed reactions that include depression, obsessive distress involving medical consequences, and feelings of anger and guilt.

A considerable amount of literature has examined the relationship between psychosocial stress and genital herpes recurrence rates (Hutfield, 1968; Juel-Jensen, 1973; Wickett, 1982). However, since these findings are based largely on anecdotal and retrospective reports, there lacks a clear relationship between psychosocial factors and genital herpes recurrences. Taylor (1979) measured a number of psychological variables in women who suffered from genital herpes. Results of this study indicated that individuals with a high recurrence rate (4 or more recurrences in the previous 12 months) reported significantly higher stress levels than those with a low recurrence rate (3 or less). While these findings tend to support a connection between genital herpes and stress, methodological concerns involving the use of retrospective report, limited characteristics of a student sample, and the lack of verification of diagnosis, hinders the interpretation of these results. Other correlational studies have also suggested a relationship between stress levels and genital herpes recurrences, but, of course, one
cannot infer causation. In these studies, genital herpes recurrence rates have been associated with stress, poor coping, lack of social support, depression, anxiety, loneliness, and life change (Glaser, Kiecolt-Glaser, Speicher, & Holliday, 1985; Kemeny, Cohen, Zagans, & Conant, 1989; Levenson, Hamer, Myers, Hart, & Kaplowitz, 1987; Mann, & Sandler, 1984; Silver, Auerbach Vishniavsky, & Kaplowitz, 1986; VanderPlate, Aral, & Madger, 1988).

Treatment studies (Burnette, Koehn, Kenyon-Jump, Hutton, & Stark, 1991; Koehn, Burnette, & Stark, 1994; Longo, Clum, & Yeager, 1988; VanderPlate, & Kerrick, 1985) have explored the impact of stress reduction on genital herpes recurrences. These studies suggested a possible causal relationship in that, at least, utilization of stress management strategies was associated with a decrease in recurrence rates.

There is currently a lack of knowledge and agreement concerning the physiological linkage between psychosocial stress and genital herpes recurrences. Hamilton (1980) proposes that the status of an individual's immune functioning may be the most important factor in predicting genital herpes recurrences. Several studies investigating immunological change and genital herpes recurrences have suggested a relationship between weaknesses in immune functioning and genital herpes outbreaks (Lopez, Kirpatrick, Read, Fitzgerald, Pitt, Pahwa, Ching, & Smithwick, 1983; Sheridan, Donnerberg, Aurelian, & Elpem, 1982; Shillitoe, Wilton, & Lehner, 1977). However, Russell, Kaiser, and Lao (1981) were unable to produce similar results. Other studies have demonstrated a relationship between stress levels and immune function where high stress is associated with a compromised immune system (Kemeny, Cohen, Zegans, & Conant, 1989; Nahmias & Roizman, 1973; Schmidt, Zyzanski, Ellner, Kumar, & Arno, 1985).
Assuming that psychosocial stress impacts herpes recurrences via a decrease in immune function, one might assume that other factors which affect an individual's health might likewise influence genital herpes recurrence rates as well. Nutrition and fitness may be two such factors. In fact, self-help books that target genital herpes sufferers have stressed the importance of diet and exercise and its relationship to the immune system's ability to control genital herpes outbreaks (Freudberg, 1982; Hamilton, 1980; Wickett, 1982). There is evidence linking nutrition and fitness to an individual's physical well-being. Belloc and Breslow (1972) examined the results of a 1965 survey of a representative probability sample of 6,928 American adults. This study indicated that there was a high correlation between seven specific personal health practices and the physical health of these individuals. These seven factors included (1) sleeping seven to eight hours, (2) daily consumption of breakfast, (3) never or rarely eating between meals, (4) weight in proportion to height, (5) abstaining from cigarette smoking, (6) moderate or no use of alcohol, and (7) regular physical activity. Breslow and Enstrom (1980) confirmed these findings and noted a lower mortality rate for both men and women who followed all seven health practices. Pollock, Wilmore, and Fox (1984) stated that physical inactivity and improper diet produce detrimental effects on the human body and are associated with major deterioration in normal body function. Balfour and Heussner (1984) suggested that factors that may be related to genital herpes recurrences include stress, poor nutrition, and a suppressed immune system. In addition to age, heredity, and prior disease experiences, behavioral patterns that include nutritional intake may influence immune potential (Hamilton, 1980).
Focus of Study

The purpose of this research was to extend the existing literature by assessing the relationship between several factors separately and combined, nutrition, fitness and stress, and herpes recurrence rates. It was hypothesized that the results from this study would indicate an inverse correlation between nutrition, fitness, and genital herpes recurrence rates and a positive correlation between stress and genital herpes.
CHAPTER II

METHOD

Participants

Participants for this study were recruited by contacting area chapters of herpes support groups, physicians, local cable access and through newspaper advertisements. Participants included 29 individuals between the ages of 24 and 56 (range: 24 to 56; mean: 35.76) who had received a positive medical diagnosis of genital herpes. During the initial screening all volunteers who completed the study reported a history of being able to identify when they were experiencing a genital herpes recurrence. On a scale of 1 (Never) to 5 (Always) participants in this study obtained a group mean score of 4.20 for the estimation of their ability to detect a genital herpes outbreak (range: 2 to 5). Two of the participants had been previously trained in progressive muscle relaxation; however, neither participant reported using this stress management technique during the past 12 months.

Apparatus/Materials

A screening form (Appendix A) was used to assess participants' eligibility regarding the criteria for inclusion in the study. A Medical Diagnosis Form (Appendix B) was given to participants to be completed by their diagnosing physicians in order to provide verification of a positive diagnosis of genital herpes.

A participant's level of physical fitness was determined by using a Monark 818E Professional Ergometer. Heart rate measures were provided by the Polar Pacer.
Heart Rate Monitor (Model #145930). A stop watch was used to obtain time variables for computing physical working capacity (PWC) scores. A release of information on a Medical Clearance Form (Appendix C) was used to allow the experimenter the ability to obtain a physician's signature for fitness testing.

A nutritional assessment for each participant was conducted using the Nutritionist III computer software data-based program by N-Squared Computing. Participants used a self-monitoring diet form (Appendix D) to record the type and amount of food consumed over two, three-day periods. A weight scale was provided to participants to assist them in recording the amount of food portions consumed. Food analysis included a nutrient ratio and percentages of caloric intake from protein, carbohydrate, fat and alcohol. This software program determined nutrient densities and ratios, identified deficiencies and excesses, and generated a personalized printout for each participant.

An assessment of weekly psychological stress levels was determined from scores obtained on the Hassle Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981). On this form, participants indicated particular hassles encountered over the previous week from a list of 118 hassles. In addition, a severity rating was coded from 1 (somewhat severe) to 3 (extremely severe) for each hassle that had occurred.

A daily log was used by participants to monitor the presence or absence of a genital sore and/or related symptoms (Appendix E). On this form, participants indicated each day if experiencing an outbreak (herpes sore present), a severity rating (high, medium or low) and/or the presence of any symptoms (pain, itching, redness, swollen).
Criterion Variable

Daily Log

Each participant was provided detailed and uniform instructions (Appendix F) and requested to maintain a daily log which indicated the presence or absence of a herpes sore, severity and symptoms of a herpes outbreak. An overall score of herpes recurrence was computed as the total number of days on which the participant indicated an outbreak out of 84 days (12-week period).

Reliability

The total number of genital herpes recurrences was assessed from the Daily Log form. One individual scored all Daily Log forms. An independent recorder tallied the days with an outbreak for 33% of the logs for each participant. The recorders had been instructed to tally an outbreak for a given day if the Daily Log form indicated (a) an endorsement of an outbreak (circled "Y" for Yes) by the participant, (b) an endorsement by the participant of at least one symptom immediately prior to, or following, a day indicating an outbreak (circled "Y" for Yes), or (c) a consecutive day with at least one symptom endorsed and indication of an outbreak during at least one of the consecutive days. Genital herpes outbreak agreement was calculated using the following formula:

\[
\text{Genital herpes outbreak agreement} = \frac{\text{Number of Agreements}}{\text{Number of Agreements} + \text{Disagreements}} \times 100
\]

where an agreement was scored when the recorded response of the reliability checkers was consistent in regards to recurrence or nonrecurrence of a genital herpes outbreak. A disagreement was defined as a discrepancy between reliability checkers in their
recorded response with regard to recurrence or nonrecurrence of a genital herpes outbreak.

Predictor Variables

Fitness Measure

The estimation of maximum working capacity was determined through the physical working capacity (PWC) test as developed by Sjostrand (1947), which has been outlined in detail in the *Y's Way to Physical Fitness* (1989). This study employed the YMCAs of America's modification of the Sjostrand test by using two, three or four, 3-minute continuous stages. Each participant's computed estimated PWC was compared to normative data tabled in the *Y's Way to Physical Fitness* (1989) to evaluate maximum working capacity.

Nutritional Measure

A calculation of the nutrient intake of each participant was determined from food consumption data collected over two, three-day periods (one weekend day for each period). A nutrient adequacy ratio (NAR) was used to represent an index of adequacy for a nutrient based on the corresponding U. S. Recommended Daily Allowance (RDA) for that nutrient. The NAR was expressed using the following formula:

\[
\text{Participant's daily intake of a nutrient} \div \text{RDA of that nutrient}
\]

The NAR values for each nutrient did not exceed 1.0 to prevent intakes in excess of the RDA for that nutrient from exceeding the index in order to prevent an
inaccurate representation of nutritional adequacy. The NAR values for each of the selected nutrients were averaged to yield a mean adequacy ratio (MAR) for each participant indicating an index of the overall quality of the diet. The MAR was expressed using the following formula (Gibson, 1990):

\[
\text{MAR} = \frac{\text{Sum of the NARs for } x \text{ nutrients}}{\text{Number of nutrients assessed}}
\]

Stress Measure

The Hassles Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981) served as a weekly measure of self-reported stress level. Each hassle item endorsed was rated for severity from 1 (somewhat severe) to 3 (extremely severe). The sum of severity ratings endorsed over a 12-week period yielded an overall hassle score for each participant.

Procedure

Initial Interview

Potential participants underwent an introductory interview (Appendix G) that provided an overview of the study and assurance of confidentiality. All participants who met the inclusion criteria assessed by using the screening form (Appendix A) and agreed to participate in the program, read and signed an informed consent (Appendix H) explaining the conditions of the study. A release of information on the Medical Clearance Form (Appendix D) was also signed by participants allowing the experimenter to obtain a physician's signature for fitness testing. In addition, a Medical Diagnosis Form (Appendix B) was signed by participants and completed by their
diagnosing physicians prior to scheduling the next session. This provided verification of a positive diagnosis of genital herpes.

Each participant was asked to participate in a fitness test and to complete a nutritional assessment. They were also asked to monitor genital herpes recurrences daily (Daily Log form) and stress levels weekly for 12 weeks (The Hassle Scale form).

**Calibration of Observation Skills**

In order to insure that participants were able to accurately record the recurrence/nonoccurrence of a genital herpes outbreak, the following testing procedure was employed. Participants were asked to read a vignette (Appendix I) of an individual experiencing a genital herpes recurrence and nonoccurrence over two, two-week periods. Using the information provided in the vignette, participants completed a sample daily log form in order to assess their ability to use the form and monitor the presence or absence of a genital herpes sore, as well as the severity and symptoms associated with the outbreak. Participants who failed to identify an outbreak and/or symptoms with 100% accuracy were provided feedback and requested to repeat the procedure until complete accuracy had been achieved. A novel vignette was used to assess accuracy once the individual had achieved 100% accuracy in the original vignette. Due to its subjective nature, the severity ratings were only assessed regarding the participants' ability to properly use the form.

In addition, five sets of five color photos of various genital infections, each set containing one photo of a herpes lesion and depicting genital herpes outbreaks in various stages (e.g., blisters, open lesions), was employed to assess participants' skills at visually identifying an outbreak. Participants were instructed to identify the herpes lesion in each set of photos. Participants who failed to identify 4 out of 5 herpes
lesions were provided feedback concerning any misidentification and were instructed to once again identify each of the five herpes lesions. The procedure was repeated until the participant was able to identify the genital herpes lesion with 100% accuracy.

**Fitness Testing**

Upon obtaining a medical clearance for each subject, a second appointment was scheduled for fitness testing, and subjects were informed of pre-test instructions to follow for the twenty-four hours prior to fitness testing. Pre-test instruction included (a) a minimum of 2 to 3 hours of abstention from eating, drinking (except water), and smoking before reporting for testing; (b) refraining from vigorous exercise within 24 hours prior to testing; and (c) informing participants who were diabetics to maintain their dietary and medication regimen as prescribed by their physician. Prior to the start of the fitness testing, participants were informed of the procedure and the physiological responses to be monitored during the test. The fitness test consisted of a participant pedaling on a stationary bicycle to gradually increasing tension levels while the researcher monitored and recorded heart rate through the use of a heart rate monitor attached around the participant's chest. A remote digital readout provided a continuous monitoring of the participant's heart rate. At no point did this become too strenuous as physiological responses were closely monitored by the experimenter. In addition, the participant was informed of unusual internal stimuli to monitor during the testing procedure (e.g., heavy breathing, perspiring, light-headedness, muscle soreness, joint pain, loss of coordination, and tightness in chest).

This study employed the YMCAs of America's modification of the Sjostrand test by using two, three or four 3-minute continuous stages. Two HR-power output data points were necessary for each participant within the 100 to 150 beats/min range.
The fitness test began once the participant had had an opportunity to become familiar with the ergometer and had received proper seating adjustment. Each participant was allowed to warm up by pedaling for 1 minute at zero work load. If the initial work load elicited a heart rate of 110 beats/min. or more, only one additional work load was required to complete the two data points. If the heart rate was lower than 110 beats/min. on the initial work load, the values obtained from the second and third work load (each above 110 beats/min.) were used. If the heart rate in the second and third minutes differed by more than 5 beats/min, the test period was extended one additional minute in order to obtain a stable heart rate value. Each work load was timed for three minutes while the researcher monitored and recorded heart rate through a pulse rate monitor attached around the participant's chest. Outlined below is the procedure that was used for determining the initial and subsequent workloads for both men and women.

**Procedure for Fitness Testing**

1. The 1st work load was set at 150 kgm/min (0.5 Kp).
2. If heart rate in 3rd minute was: (a) less than (<) 80, the 2nd work load was set at 750 kgm/min (2.5 Kp), (b) between 80 and 89, the 2nd work load was set at 600 kgm/min (2.0 Kp), (c) between 90 and 100, the 2nd work load was set at 450 kgm/min (1.5 Kp), and (d) greater than (>) 100 the 2nd work load was set at 30 kgm/min (1.0 Kp).
3. If the heart rate in the 3rd minute of 2nd work load was (a) less than (<) 80, the 3rd work load was set at 900 kgm/min (3.0 Kp), (b) between 80 and 89, the 3rd work load was set at 750 kgm/min (2.5 Kp), (c) between 90 and 100 the 3rd work load
was set at 600 kgm/min (2.0 Kp), and (d) greater than (>) 100, the 3rd work load will be set at 450 (1.5 Kp).

4. If the heart rate in the 3rd minute of 3rd work load was (a) less than (<) 80, the 4th work load was set at 1050 kgm/min (3.5 Kp), (b) heart rate between 80 and 89, the 4th work load was set at 900 kgm/min (3.0), (c) between 90 and 100, the work load was set at 750 kgm/min (2.5 Kp), and (d) greater than (> )100 the 4th work load was set at 600 kgm/min (2.0).

5. If the 1st workload elicited a heart rate of 110 or more, it was used as the first data point and only one more work load was required.

**Nutritional Assessment**

The nutritional assessment involved each participant completing a health history profile and recording food choices and portions over two, three-day periods. The first three-day period was during the first two weeks of participation in the study and the second period was during the last two weeks (weeks 11 and 12). Participants were trained in the proper methods of computing and recording a weighed food record (Appendix J). In addition, the researcher provided scales and a demonstration in the proper method of weighing food items. All food consumed over two, three-day periods (which included one weekend day per three-day period) was to be weighed by the participant and recorded on a three-day diary provided by the researcher.

**The Hassle Scale**

The Hassle Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981) was used as a weekly psychological stress inventory. Participants were provided instructions
(Appendix K) and asked to indicate at the end of each week any hassles experienced and the level of severity of each hassle endorsed.

**Daily Log**

Participants were asked to monitor genital herpes recurrences by maintaining a daily log. Participants using the daily log form were instructed to indicate the presence or absence of a genital herpes sore, severity and/or associated symptoms.

**Data Analysis**

A multiple regression analysis was used for data analysis. The total number of days during the 12-week period in which a participant indicated an outbreak was entered as the criterion variable. The scores from the fitness test (PWC score), nutritional score (MAR score), and the stress inventory score (total sum of severity rating) were entered as the predictor variables.
CHAPTER III

RESULTS

Reliability Checks for Daily Log

Recorder agreement for the Daily Log was assessed using the percentage agreement method. Twenty-eight recorder agreement checks (four-week block) were made over the 12-week period for each participant to assess overall agreement (genital herpes recurrence and nonoccurrence combined) and herpes recurrence alone. Reliability checks were conducted for 33.33% of the 12-week period for all participants. Overall agreement for the 812 checks (twenty-eight days each for twenty-nine participants) was 99.63% (range, 96.43% to 100%). Overall agreement on genital herpes recurrence alone was 99.21% (range, 94.12% to 100%).

Calibration of Observation Skills Outcomes

Recording Occurrence/Nonoccurrence of a Genital Herpes Outbreak

Using the information provided in the vignette, participants completed a sample daily log form in order to assess their ability to use the form and monitor the presence or absence of a genital herpes sore, as well as the symptoms associated with the outbreak. Nineteen of the twenty-nine participants were able to identify an outbreak and/or symptoms with 100% accuracy on the first attempt. The ten remaining participants identified an outbreak and/or symptom with 85.71% accuracy (range, 71.42% to 96.43%). Following feedback these ten participants were requested to
repeat the procedure and all were able to achieve 100% accuracy on the second attempt with the original vignette. In addition, a second, novel vignette was introduced to the same ten participants and 100% accuracy was achieved by each individual during one trial. Overall accuracy on the original vignette was 95.07% (range, 71.42% to 100%).

**Visual Identification of Genital Herpes Outbreak**

Five sets of five color photos of various genital infections, each set containing one photo of a herpes lesion and depicting genital herpes outbreaks in various stages (e.g., blisters, open lesions) was employed to assess participants skills at visually identifying an outbreak. Participants were instructed to identify the herpes lesion in each set of photos. Twenty-three of the twenty-nine participants were able to correctly identify at least 4 out of 5 photos of herpes lesions. Ten of these twenty-three participants correctly identified all 5 photos depicting a genital herpes outbreak. The nineteen participants who did not correctly identify all 5 photos on their first attempt were provided feedback and all achieved 100% accuracy when the procedure was repeated a second time.

**Results of Data Analysis**

The focus of this study was to assess the effects and the magnitude of the effects, combined and separately, of nutrition, fitness and stress on genital herpes recurrence rates using a multiple regression analysis.

Food choices and amount recorded by participants were entered into a computer software data-based program that yielded nutritional data for 49 nutrients based on corresponding U. S. Recommended Daily Allowance (RDA) for each nutrient. Twenty-one nutrients from the nutrient analysis were selected for their proposed role in
helping to bolster the immune system against the onset of viral infection (Bendich, A. & Chandra, R. K., 1990; Gershwin, M. E., Beach, R. S., & Hurley, L. S., 1985). These nutrients included kilocalories, protein, carbohydrates, fat, saturated fatty acids, linoleic fatty acid, magnesium, zinc, vitamin A, vitamin C, vitamin B₆, folate, vitamin B₁₂, pantothenic acid, lysine, copper, manganese, mono fatty acid, poly fatty acid, biotin and alpha-tocopherol. Using the formulas outlined in the method section, a mean adequacy ratio (MAR) was obtained for each participant and used as the nutrition score (i.e., MAR). The group mean for participants’ MAR scores was 0.83 (range, 0.56 to 1.00).

The fitness test provided an estimation of maximum working capacity for each participant. The number obtained from the physical working capacity (PWC) test, outlined in detail in the Y's Way to Physical Fitness (1989), was used as the fitness score (i.e., PWC). The group mean for participants’ PWC scores was 35.37 (range, 0.00 to 90.00).

The Hassles Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981) served as a weekly measure of self-reported stress level. The sum of severity ratings endorsed by each participant over a 12-week period provided a stress score (i.e., Hassle). The group mean for participants’ hassle scores was 276.86 (range, 33 to 1476).

The Daily Log was used to indicate the presence or absence of a herpes sore over an 84-day period (12 weeks). Genital herpes recurrence rates were computed as the total number of days on which the participant was assessed as having an outbreak and served as the outbreak score (i.e., Outbreak). The group mean for Outbreak scores was 13.14 (range, 0 to 34).

A multiple regression analysis was performed to assess the relationship between several factors combined and separately, nutrition, fitness and stress, and herpes.
recurrence rates. Tables 1 (combined) and 2 (separately) show that these factors did not predict the recurrence rates of genital herpes for participants in this study.

Table 1

ANOVA Summary Table for Regression Analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Squares</th>
<th>F-Ratio</th>
<th>Probability &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>71.316</td>
<td>3</td>
<td>23.772</td>
<td>0.210</td>
<td>0.888</td>
</tr>
<tr>
<td>Error</td>
<td>2711.934</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2783.250</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multiple R = 0.160
R² = 0.0256
Adjusted R² = -0.096
Standard Error of Estimate = 10.630

Table 2

Coefficients for Hassle, MAR, and PWC as Predictor Variables

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coefficient</th>
<th>Standard Error Estimate</th>
<th>t Statistic</th>
<th>Probability &gt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hassle</td>
<td>-0.003022</td>
<td>0.006950</td>
<td>-0.434807</td>
<td>0.667</td>
</tr>
<tr>
<td>MAR</td>
<td>0.658052</td>
<td>0.210050</td>
<td>0.313328</td>
<td>0.757</td>
</tr>
<tr>
<td>PWC</td>
<td>-0.032849</td>
<td>0.077405</td>
<td>-0.424381</td>
<td>0.675</td>
</tr>
<tr>
<td>Constant</td>
<td>9.781299</td>
<td>18.666149</td>
<td>0.524013</td>
<td>0.605</td>
</tr>
</tbody>
</table>

It was hypothesized that the results from this investigation would indicate an inverse correlation between nutrition, fitness, and genital herpes recurrence rates and a
positive correlation between stress and genital herpes. However, Table 3 shows that no correlation was found among these predictor variables and genital herpes recurrence rates. In fact, comparing the data from the fitness testing (PWC) and the stress inventory (Hassle) with recurrence rates data (Outbreak) indicates a trend that was slightly in the opposite direction than originally hypothesized.

Table 3
Correlation Matrix of Criterion (Outbreak) and Predictor Variables

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Outbreak</th>
<th>Hassle</th>
<th>MAR</th>
<th>PWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbreak</td>
<td>1.000</td>
<td>-0.117</td>
<td>0.102</td>
<td>-0.095</td>
</tr>
<tr>
<td>Hassle</td>
<td>-0.117</td>
<td>1.000</td>
<td>-0.311</td>
<td>0.042</td>
</tr>
<tr>
<td>MAR</td>
<td>0.102</td>
<td>-0.311</td>
<td>1.000</td>
<td>-0.073</td>
</tr>
<tr>
<td>PWC</td>
<td>-0.095</td>
<td>0.042</td>
<td>-0.073</td>
<td>1.000</td>
</tr>
</tbody>
</table>

A large number of research studies have examined psychosocial stress and herpes outbreaks and have suggested a relationship between stress levels and genital herpes recurrences. However, as a group the participants in this study did not demonstrate an association between stress and genital herpes recurrence rates. When these data were plotted individually, 5 of the 29 participants demonstrated high stress severity concurrent with high genital herpes recurrence rates. Figures 1 through 5 show graphic representation of reported stress (Hassle) and herpes recurrence rates (Outbreak) for these five participants. The lower panel for each participant depicts a one-week forward shift of the hassle score to assess any delay in cumulative effects of reported stress level on recurrences.

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Figure 1. Graphic Representation of Hassle and Outbreak Data for Participant #0650.
Figure 2. Graphic Representation of Hassle and Outbreak Data for Participant #2194.
Figure 3. Graphic Representation of Hassle and Outbreak Data for Participant #2516.
Figure 4. Graphic Representation of Hassle and Outbreak Data for Participant #5037.
Figure 5. Graphic Representation of Hassle and Outbreak Data for Participant #8747.
CHAPTER IV

DISCUSSION

The focus of this study was to assess the relationship between several factors combined and separately, nutrition, fitness and stress, and herpes recurrence rates. The results reported above indicated that nutrition, fitness and stress, assessed combined and separately, did not predict the recurrence rates of genital herpes for the participants in this study. In fact, when comparing scores obtained from the fitness testing and the stress inventory with recurrence rates data, the trend was slightly in the opposite direction than that hypothesized.

It was hypothesized that the results from this study would indicate an inverse correlation between nutrition, fitness, and genital herpes recurrence rates and a positive correlation between stress and genital herpes. However, no correlation was found among these predictive variables and genital herpes recurrence rates. In fact, comparing the data from the fitness testing (PWC) and the stress inventory (Hassle) with recurrence rates data (Outbreak) indicates a trend that was slightly in the opposite direction than originally hypothesized.

Several factors may have played a role in these findings. When measuring food consumption, some participants may have changed their typical eating patterns in order to simplify the measuring or weighing process, or to impress the experimenter (Marr, 1971; Pekkarinen, 1970). Although precision is greater in the weighed record compared to the estimated record procedure, respondent burden for producing food records is higher than, for example, the twenty-four hour recall method. Hence, some
participants may have been less motivated to cooperate with this procedure. In addition, errors in recording food choices or amounts and/or misreading of the weighing scale may have occurred for some participants. Future research in this area may wish to use protein assays which provide more accurate information on global nutritional status than those of other nutrients such as carbohydrates and fats (Chandra & Newberne; 1977).

Research in the area of physical fitness has demonstrated that the maximum heart rate has a wide range of values at any age (Y's way to Physical Fitness, 1989). The formula of 220 minus age predicts an individual's maximum heart rate. For example, a 35-year-old male would have a predicted maximum heart rate of 175. It should be noted that this prediction is only a representative of the average of the population of 35-year-old males and does not take into consideration individual variations. Hence, if the estimated maximum heart rate is too high, maximum physical working capacity (PWC) will be overestimated; or, if too low, the PWC will be underestimated. Accuracy can be improved if the true maximum heart rate is known. However, this rate could only be obtained by utilizing a recent ECG test which was beyond the scope and limitations of this study. In addition, it should be noted that participants who may have been unfamiliar with bicycle exercise may be less efficient than individuals who bicycle regularly (Y's way to Physical Fitness, 1989). Therefore, it would be important to remember that the physical working capacity test is an estimation or prediction of maximal responses and has a greater chance of being in error than if a participant was exercised to the maximum rate. And, it must be recognized that poor or incorrect predictions may occur as a result of this limitation. Furthermore, physical working capacity is only one component of physical fitness. It may be possible for an individual to score high in one component and low in another.
Obtaining a profile containing the chief components (cardiovascular fitness, muscular strength, endurance and flexibility) and motor fitness components (agility, balance, reaction time, coordination, power and speed) may yield a truer overall picture of an individual's state of physical fitness.

As a group the participants in this study did not demonstrate an association between stress and genital herpes recurrence rates. This investigation was incongruent with results similar of other correlational studies that suggest a relationship between stress levels and genital herpes recurrence rates (Glaser, Kiecolt-Glaser, Speicher, & Holliday, 1985; Kemeny, Cohen, Zagans, & Conant, 1989; Levenson, Hamer, Myers, Hart, & Kaplowitz, 1987; Mann, & Sandler, 1984; Silver, Auerbach Vishniavsky, & Kaplowitz, 1986; VanderPlate, & Magder, 1988). However, when these data are plotted individually 5 of the 29 participants demonstrate high stress severity concurrent with high herpes recurrence rates. This relationship may be due to an overall higher sensitivity to stress and/or inadequate coping strategies for psychological variables (Silver, Auerbach, Vishniavsky, & Kaplowitz; 1986). It may be that individuals in this subgroup are best suited for stress reduction strategies that have been associated with a decrease in genital herpes recurrence rates (Burnette, Koehn, Kenyon-Jump, Hutton, & Stark, 1991; Koehn, Burnette, & Stark, 1994; Longo, Clum, & Yeager, 1988; VanderPlate, & Kerrick, 1985). In addition, the duration of this study (12 weeks) may have been too short to adequately assess the relationship of stress and its cumulative effects to herpes recurrence rates for some participants. Furthermore, the measurement of stress is a complex issue and additional information of stress may be beneficial in securing a more complete picture of an individual's stress level. Other sources or inventories in addition to the Hassles Scale, such as an individual's significant other, the Daily Stress Inventory (DSI; Brantley, Waggoner, Jones, & Rappaport, 1987), the
Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982) and the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980), may enhance this assessment process.

Several studies investigating immunological change and genital herpes recurrences have suggested a relationship between weaknesses in immune functioning and genital herpes outbreaks (Lopez, Kirpatrick, Read, Fitzgerald, Pitt, Pahwa, Ching, & Smithwick, 1983; Sheridan, Donnerberg, Aurelian, & Elpern, 1982; Shillitoe, Wilton, & Lehner, 1977). This study obtained one measure each for nutrition, fitness and stress to assess immune functioning in relation to herpes recurrence rates. It may be important for future investigations to obtain additional measures of stress, clinical symptoms and/or conduct a battery of immunological and nutritional assays to more accurately assess immune function.

In conclusion, factors in this study (nutrition, fitness and stress) were not predictive (separately or combined) of genital herpes recurrence rates. In addition, nutrition and fitness were not negatively correlated, or stress positively correlated, with recurrence rates as expected. The incongruity in this investigation with other research studies may be due to certain characteristics of the participants in this study. Data from the assessment of nutrition (mean score in the upper twenty percent range) and fitness (mean score in the lower thirty-five percent range) suggest insufficient heterogeneity for these participants regarding these two variables and may have skewed the results. A larger sample size may have produced a more representative sample of genital herpes sufferers.

In addition, another factor contributing to these findings may be the utilization of volunteers, national HSV support group participants, and/or the combination of volunteers and support group participants. Some research finding have suggested significant differences between these two participant pools in regards to demographics,
personality characteristics, use of coping strategies and disease history (Manne & Sandler, 1984; Manne, Sandler, & Zautra; 1986). This study included participants from both of these participant pools.

Furthermore, anecdotal reports from participants in this investigation portray individuals with genital herpes infections that range from severe (six or more recurrences reported in twelve month period) to mild (two or less recurrences reported in twelve month period). Hence, findings of this study include this wide range of herpes sufferers and would not necessarily hold for a group of individuals confined to a restricted frequency range of herpes outbreaks over the same time period. For example, results of Taylor's (1979) study indicated that individuals with a high recurrence rate (4 or more recurrences in previous 12 months) reported significantly higher stress levels than those with a low recurrence rate (3 or less).

Further research is required to determine if homogeneously grouping individuals by the severity of the herpes infection as well as by their overall coping ability yield different results. Some individuals may cope better with stress than others, and this enhanced coping ability could moderate the cumulative effects of stress. Therefore, the assessment of an individual's coping skills may be an important issue of consideration for future research. Finally, a more complete test of the relationship between behavioral factors and genital herpes would measure behavior, clinical symptoms and immune function.
Appendix A

Initial Screening Form
INITIAL SCREENING FORM

Code #: ___________________  Date: ___________________

List the approximate location(s) of your herpes outbreaks and place an circle on the picture on the next page that corresponds to the location(s) listed below:

Describe herpes symptoms you experience prior, during and after outbreaks:

What is your estimation of your ability to detect a herpes outbreak (circle one):

<table>
<thead>
<tr>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

You will be shown five sets of five pictures that depict sexually transmitted diseases. Each set will contain one picture of a genital herpes outbreak. Write the number for each set next to the Set # that corresponds to the picture of a genital herpes outbreak. (Example: Set # 0: 3)

Set #1:  Set #2:  Set #3:  Set #4:  Set #5:
Appendix B

Medical Diagnosis Form
Medical Diagnosis Form

Dear Doctor:

I, ___________________________________________ have agreed to participate in a
Name of participant
research study designed to assess nutrition, fitness, stress and genital herpes recurrences.

Please release the following information concerning my diagnosis of genital herpes:

A positive medical diagnosis of genital herpes for the person named above has
___ been determined by medical lab test.
___ been determined by medical observation.
___ not been determined.

Participant's Signature ________________________________ Date ____________

Physician's Name ________________________________ Date ____________
Address ________________________________________ Telephone ____________
City and State ____________________________________ Zip ____________

If you have any questions, please feel free to call:
Carman E. Stark  (616) 349-8242 or Dr. M. Michele Burnette (616) 387-4482.

Please mail to:  Dr. M. Michele Burnette
Department of Psychology
Western Michigan University
Kalamazoo, Michigan 49008

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Dear Doctor:

I, __________________________ am interested in participating in a

Name of participant

sub-maximal fitness testing procedure in order to evaluate cardiorespiratory fitness.

The fitness test consists of two or three work loads in which an individual will pedal on a stationary bicycle to gradually increasing tension levels while their heart rate and blood pressure are monitored by the researcher. At no point will this become too strenuous as physiological responses will be closely monitored by the experimenter. If the participant's heart rate exceeds 150 beats/min, the test will be terminated. Also, if a participant’s systolic blood pressure exceeds 200 or diastolic pressure exceeds 110, the procedure will be terminated. In addition, the participant will be informed of unusual internal stimuli to monitor during the testing procedure (heavy breathing, perspiring, light-headedness, muscle soreness, joint pain, loss of coordination, and tightness in chest). If any unusual symptoms should occur, the participant will be instructed to stop pedaling and inform the researcher.

By completing the form below, however, you are not assuming any responsibility for our administration of the fitness testing program.

If you know of any medical reason why participation in the fitness program by the applicant would be unwise, please indicate so on this form.

In addition to your medical approval and recommendations, the participant will be asked to sign informed consent forms prior to engaging in fitness testing that will explain any possible risks.

Please release the following information concerning my ability to participate in the above fitness test.

Participant's Signature ____________________________ Date ____________

___ I know of no reason why the applicant may not participate.

___ I believe the applicant can participate, but urge caution because

___ The applicant should not engage in the following activities:

___ I recommend that the applicant NOT participate.

Physician's Signature ____________________________ Date ____________

Address ____________________________ Telephone ____________

City and State ____________________________ Zip ____________

If you have any questions, please feel free to call:
Carmen E. Stark (616) 349-8242 or Dr. M. Michele Burnette (616) 387-4482.

Please mail to: Dr. M. Michele Burnette
Department of Psychology
Western Michigan University
Kalamazoo, Michigan 49008
Appendix D
Nutrition Assessment Form
COMPUTERIZED NUTRITION ASSESSMENT

Name                            Date
Address                         
City                            State
Home Phone                      Work Phone
Age                             Sex

Health History Profile

Family History:
Please check any of the following that apply to your family members (parents, grandparents, brothers, sisters):

___ Diabetes
___ Heart attack, stroke
___ Elevated cholesterol/triglycerides
___ High Blood pressure
___ Osteoporosis

Personal Health History:
Please check any of the following conditions which apply to your current health status:

___ Diabetes      ___ Take insulin
___ Elevated cholesterol/triglycerides
___ High Blood pressure
___ Hypoglycemia
___ Osteoporosis
___ 20 pounds or more overweight
___ Pregnancy
___ Eating disorder - take laxatives, diuretics, or induce vomiting to control weight
___ Food Allergies
___ Other: Please explain________________________________________________________

Please list any medications you are currently taking including any vitamin or mineral supplements:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Code #</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete Food Description</th>
<th>Portion</th>
<th>Complete Food Description</th>
<th>Portion</th>
<th>Complete Food Description</th>
<th>Portion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Return this form in stamped envelope to:
Dr. M. Michele Burnette
Department of Psychology
Western Michigan University
Kalamazoo, Michigan 49008

If you have any questions, please call (616) 387-4489 or 349-8242.
Appendix E
Daily Log Form
Code #: ____________  DAILY LOG  Date: From ____________ to ____________

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity:</td>
<td>Severity:</td>
<td>Severity:</td>
<td>Severity:</td>
<td>Severity:</td>
<td>Severity:</td>
<td>Severity:</td>
</tr>
<tr>
<td>H M L</td>
<td>H M L</td>
<td>H M L</td>
<td>H M L</td>
<td>H M L</td>
<td>H M L</td>
<td>H M L</td>
</tr>
</tbody>
</table>

• Directions: Circle appropriate letter(s) for each day of the week.

• Instruction Key: Y = Yes; N = No; H = High; M = Medium; L = Low; P = Pain; I = Itching; R = Redness; S = Swollen.

• Note: Outbreak is defined as having a herpes sore present.

• Remember to fill out and include the Hassle Scale at the end of each week.

• Write code number at top of form, indicate beginning and ending dates of week and mail in the envelop provided at the end of the week.

• If you have any questions or concerns, please call Carman Stark at 387-4489 (leave message) or 349-8242 (home).

• If you take any medication, please list type, dosage, number of times per day, and date(s) below.
Appendix F

Instructions for Daily Log
INSTRUCTIONS FOR DAILY LOG

The Daily Log is a form that you will use to monitor your herpes outbreaks, the severity of that outbreak and any symptoms you may be experiencing prior, during and after each recurrence. A herpes outbreak is defined as having a herpes sore present. On the top of each form is a place for you to write your code number and the current week. For each day of the week, please check the usual location(s) in which you have experienced a herpes outbreak in the past. Circle "Y" (Yes) if a herpes sore is present or "N" (No) if you do not detect a herpes sore on that day. If you circle "Y" (Yes), indicate the severity of that outbreak by placing a circle around "L" (Low), "M" (Moderate) or "H" (High). To judge the severity rating of the current outbreak, use your past outbreaks as a gauge. The letter "L" (Low) would correspond to an outbreak that has minimal impact on you physically during the course of the day. The letter "H" (High) would correspond to an outbreak similar to the most severe outbreak you have previously experienced, physically. The letter "M" (Moderate) would correspond to an outbreak that would rate in severity somewhere in between these two points of reference. In addition, please indicate for each day of the week any symptoms you may be experiencing. You may be experiencing herpes related symptoms before, during and after an outbreak; therefore, indicate any of the symptoms noted regardless of whether a herpes sore is present. Under symptoms, the letter "P" corresponds to Pain, the letter "I" to Itching, the letter "R" to Redness and the letter "S" to Swollen. For example, if on a given day you notice a redness and an itching (or tingling) sensation in the general area(s) of past outbreaks, you would circle the letters "R" and "I". At the end of each week, you are asked to mail the Daily Log form in the stamped and addressed enveloped provided. Also, if you have any questions or concerns regarding the monitoring of your herpes outbreaks, please feel free to contact the researcher at the phone number(s) provided.

Do you have any questions or comments?

Now, I would like you to read the following vignette of an individual during a four-week period. Please use this sample Daily Log form to circle the appropriate letters under "Outbreak", "Severity" and "Symptoms".
Appendix G

Introducing the Study
INTRODUCING THE STUDY

The title of this study is *Nutrition, Fitness, Stress and Genital Herpes Recurrences*. This research study is designed to assess the relationship of nutrition, fitness, stress to genital herpes recurrence rates. Participation in this study is voluntary and you may withdraw at any time.

If you meet the study's criteria and agree to participate, you will be requested to complete and return (a) two Computerized Nutrition Assessment Forms that provide a health history profile and a record of food choices and portions over two, three-day periods, (b) The Hassles Scale that provides a weekly measure of self-reported stress level over a 12-week period, and (c) a Daily Log that provides a daily record of herpes outbreaks, severity and/or symptoms over a 12-week period.

You will be requested to sign a release that allows your physician to sign a Medical Diagnosis Form verifying that you have been diagnosed as having genital herpes. In addition, a release is required from you that allows your physician to verify that you do not have any physical limitations preventing you from participating in fitness testing. You will be notified by phone or mail by the researcher if your physician does not recommend that you participate in the fitness testing. If you do not qualify for fitness testing all documents related to your research file will be destroyed.

The purpose of the fitness testing is to evaluate cardiorespiratory fitness. The cardiorespiratory fitness test involves pedaling a stationary bicycle to gradually increasing tension levels while your heart rate is monitored by the researcher through the use of an exercise/pulse monitor. The cardiorespiratory fitness test involves two or three, 3-minute work loads of pedaling a stationary bicycle to gradually increasing tension levels while your heart rate is monitored by the researcher through the use of a pulse rate monitor. At no time will this become too strenuous.

All personal information obtained from the instrumentation and the structured, clinical interview will be kept confidential. A code number will be assigned to your name which will be used to identify all information relating to you. The primary researcher will keep a master list which matches your name to the coded data.

Do you have any questions or concerns at this point?
Appendix H

Informed Consent
Informed Consent for Participation in Research Study

Project Name: Nutrition, Fitness, Stress and Genital Herpes Recurrences

Investigators: Carman E. Stark, M. A. & M. Michele Burnette, Ph.D.

I understand that I have been invited to participate in a research study designed to assess nutrition, fitness, stress and genital herpes recurrences. I am aware that my participation in this study is voluntary and that I may withdraw my consent at any time.

As a participant in this study, I agree to complete and return the following nutritional, psychological and physiological instruments:

• Computerized Nutrition Assessment Form: a health history profile and a record of food choices and portions over a three day period.
• The Hassles Scale: a weekly measure of self-reported stress level over a 12 week period.
• Daily Log: a daily record of herpes outbreaks and/or symptoms over a 12 week period.

The Medical Diagnosis Form is a form that my physician will need to sign to verify that I have been diagnosed as having genital herpes.

The Medical Clearance Form is a form that my physician will need to sign to verify that I do not have any physical limitations preventing me from participating in fitness testing. I understand that I will be notified by phone or mail by the researcher if my physician does not recommend that I participate in the fitness testing. If I do not qualify for fitness testing all documents related to my research file will be destroyed.

I also understand that I will undergo fitness testing. The purpose of the fitness testing is to evaluate cardiorespiratory fitness. The cardiorespiratory fitness test involves two or three 3 minute work loads of pedaling a stationary bicycle to gradually increasing tension levels while my heart rate and blood pressure are monitored by the researcher through the use of a pulse rate/blood pressure monitor. I understand that if my heart rate exceeds 150 beats/min at any time the testing will be terminated. Also, if my systolic blood pressure exceeds 200 or diastolic pressure exceeds 110, the procedure will be terminated.

I understand that I am responsible for monitoring my own physiological responses (heavy breathing, perspiring, light-headedness, muscle soreness, joint pain, loss of coordination, and tightness in chest) throughout the fitness testing. If any unusual symptoms should occur, I will stop pedaling and inform the researcher. The reaction of the cardiorespiratory system cannot be predicted with complete accuracy. There is a risk of abnormalities of blood pressure and/or heart rate that might occur during or following exercise. I understand that safety factors are built into the fitness testing procedure and that the session will be immediately terminated if conditions become unsafe.

I also understand that the personal information obtained from the above instrumentation and the structured, clinical interview will be kept confidential. I understand that a code number will be assigned to my name which will be used to identify all information relating to me. The primary researcher will keep a master list which matches my name to the coded data.

I understand that any questions or complaints can be directed to Carman E. Stark at (616) 349-8242 or Dr. M. Michele Burnette at (616) 387-4482.

My signature indicates that I understand the above information and have decided to participate in this study.

Name_________________________ Date_________________________

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Appendix I
Male and Female Vignettes
VIGNETTE FOR MALE PARTICIPANT

Monday: During the day the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually experienced prior to an outbreak.

Tuesday: During the day the person checks his genital area and does not notice any visible signs of a herpes sore. Later in the day he feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection in the privacy of the restroom at work he is unable to notice any visible signs of a herpes sore. He does not experience any unusual discomfort and returns to work station.

Wednesday: While getting ready for work in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he is unable to notice any visible signs of a herpes sore. However, he begins to notice a redness on the side of his penis that is slightly tender to the touch. Though somewhat concerned he finishes getting dressed and puts in a full day at work.

Thursday: While getting ready for work in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he is unable to notice any visible signs of a herpes sore. The redness on the side of the penis is darker in color and larger in size. It has also become more tender to the touch slightly puffy in appearance. He puts in a full day at work but on occasion needs to leave his desk due to discomfort from sitting in a chair for extended periods.

Friday: While getting ready for work in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he notices in the center of the redness area several small blister-like bumps on the side of his penis. The area feels very tender and he notices a slight swollenness in his lymph nodes in the groin area.

Saturday: While getting up in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores were present the day before. Upon inspection he notices in the center of the redness area more blister-like sores on the side of his penis. The area remains very tender and the swollenness in his lymph nodes causes considerable discomfort.

Sunday: While getting up in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores were present the day before. Upon inspection he notices in the center of the redness area the blister-like sores that are now crusted over on the side of his penis. The area remains very tender and the swollenness in his lymph nodes has subsided but still causes some discomfort.

Monday: While getting ready for work in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present. Upon inspection he notices in the center of the redness area that contains only two small
less tender and the swollenness in his lymph nodes has disappeared without any discomfort.

Tuesday: While getting ready for work in the morning the person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present. Upon inspection he notices only a slight redness and small blister-like sores are still crusted over on the side of his penis. The area is only slightly tender, he notices no swollenness in the lymph nodes and experiences no physical discomfort.

Wednesday: While getting ready for work in the morning the person feels only a very slight tenderness on the side of his penis where herpes sores have been present. Upon inspection he notices only a slight redness and no obvious sores on the side of his penis.

Thursday: While getting ready for work in the morning the person feels only a very slight tenderness on the side of his penis where herpes sores have been present. Upon inspection he notices a slight red area and no obvious sores on the side of his penis.

Friday: While getting ready for work in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak.

Saturday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
VIGNETTE FOR MALE PARTICIPANT

Monday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Tuesday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Wednesday: During the day the person checks his genital area and does not notice any visible signs of a herpes sore. Later in the day he feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. He does not experience any unusual discomfort.

Thursday: During the day the person checks his genital area and does not notice any visible signs of a herpes sore. He feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection later that day he notices a slight redness in the same general area. He does not experience any unusual discomfort.

Friday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Saturday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Monday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
Friday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Saturday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
Monday: During the day the person checks his genital area and does not notice any visible signs of a herpes sore. Later in the day he feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection later that day he notices a slight redness in the same general area. He does not experience any unusual discomfort.

Tuesday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he is unable to notice any visible signs of a herpes sore. However, he begins to notice a more visible redness on the side of his penis. He does not experience any unusual discomfort.

Wednesday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he is unable to notice any visible signs of a herpes sore. The area feels somewhat tender and he notices a slight swelling in his lymph nodes in the groin area.

Thursday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores have been present in the past. Upon inspection he notices in the center of the redness area several small blister-like bumps on the side of his penis. The area feels very tender and he notices an increase in swelling in his lymph nodes in the groin area.

Friday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores were present the day before. Upon inspection he notices in the center of the redness area more blister-like sores on the side of his penis. The area remains very tender and the swelling in his lymph nodes causes considerable discomfort.

Saturday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores were present the day before. Upon inspection he notices in the center of the redness area even more blister-like sores on the side of his penis. The area remains very tender and the swelling in his lymph nodes still causes considerable discomfort.

Sunday: The person again feels an itching and tingling sensation on the side of his penis where herpes sores were present the day before. Upon inspection he notices in the center of the redness area the blister-like sores that are now crusted over on the side of his penis. The area remains very tender and the swelling in his lymph nodes has subsided but still causes some discomfort.

Monday: The person does not feel an itching and tingling sensation on the side of his penis where herpes sores have been present. Upon inspection he notices in the center of the redness area the blister-like sores remain crusted over on the side of his penis. The area is now moderately tender and the swelling in his lymph nodes causes only a very slight discomfort.
Tuesday: The person does not feel an itching and tingling sensation on the side of his penis where herpes sores have been present. Upon inspection he notices in the center of the redness area that contains only two small blister-like sores crusted over on the side of his penis. The area is now considerably less tender and the swolleness in his lymph nodes has disappeared without any discomfort.

Wednesday: The person again does not feel an itching and tingling sensation on the side of his penis where herpes sores have been present. Upon inspection he notices only a slight redness and the two small blister-like sores are barely visible and only slightly crusted over on the side of his penis. The area is only slightly tender, he notices no swolleness in the lymph nodes and experiences no physical discomfort.

Thursday: The person feels only a very slight tenderness on the side of his penis where herpes sores have been present. Upon inspection he notices only a very slight redness and no obvious sores on the side of his penis.

Friday: The person does not feel any tenderness on the side of his penis where herpes sores have been present. Upon inspection he notices a slight red area and no obvious sores on the side of his penis.

Saturday: The person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak.

Sunday: The person checks his genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
VIGNETTE FOR FEMALE PARTICIPANT

Monday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually experienced prior to an outbreak.

Tuesday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore. Later in the day she feels an itching and tingling sensation on the right inner lip of her vulva where herpes sores have been present in the past. Upon inspection in the privacy of the restroom at work she is unable to notice any visible signs of a herpes sore. She does not experience any unusual discomfort and returns to her work station.

Wednesday: While getting ready for work in the morning the person again feels an itching and tingling sensation where herpes sores have been present in the past. Upon inspection she is unable to notice any visible signs of a herpes sore. However, she begins to notice a redness just inside the right lip of her vulva that is slightly tender to the touch. Though somewhat concerned she finishes getting dressed and puts in a full day at work.

Thursday: While getting ready for work in the morning the person again feels an itching and tingling sensation just inside the right lip of her vulva where herpes sores have been present in the past. Upon inspection she notices in the center of the redness area several small blister-like bumps. The area feels very tender and she notices a slight swollenness in his lymph nodes in the groin area.

Friday: While getting ready for work in the morning the person again feels an itching and tingling sensation just inside the lip of her vulva where herpes sores have been present in the past. Upon inspection she notices in the center of the redness area more blister-like sores just inside the right lip of her vulva. The area remains very tender and the swollenness in her lymph nodes causes considerable discomfort.

Saturday: While getting up in the morning the person again feels an itching and tingling sensation just inside the right lip of her vulva where herpes sores were present the day before. Upon inspection she notices in the center of the redness area more blister-like sores just inside the right lip of her vulva. The area remains very tender and the swollenness in her lymph nodes has subsided but still causes some discomfort.

Sunday: While getting up in the morning the person again feels an itching and tingling sensation just inside the lip of her vulva where herpes sores were present the day before. Upon inspection she notices in the center of the red area the blister-like sores that are now crusted over just inside the right lip of her vulva. The area remains very tender and the swollenness in her lymph nodes has subsided but still causes some discomfort.

Monday: While getting ready for work in the morning the person again feels an itching and tingling sensation just inside the right lip of her vulva where herpes sores have been present. Upon inspection she notices in the center of the red area only two small blister-like sores crusted over just inside the right lip of her vulva. The area remains
considerably less tender and the swollenness in her lymph nodes has disappeared without any discomfort.

Tuesday: While getting ready for work in the morning the person again feels an itching and tingling sensation just inside the right lip of her vulva where herpes sores have been present. Upon inspection she notices only a slight redness where small blister-like sores are still crusted over just inside the right lip of her vulva. The area is only slightly tender, she notices no swollenness in the lymph nodes and experiences no physical discomfort.

Wednesday: While getting ready for work in the morning the person feels only a very slight tenderness just inside the right lip of her vulva where herpes sores have been present. Upon inspection she notices only a slight redness and no obvious sores just inside the right lip of her vulva.

Thursday: While getting ready for work in the morning the person feels only a very slight tenderness just inside the right lip of her vulva where herpes sores have been present. Upon inspection she notices a slight red area and no obvious sores just inside the right lip of her vulva.

Friday: While getting ready for work in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak.

Saturday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
VIGNETTE FOR FEMALE PARTICIPANT

Monday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Tuesday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Wednesday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore. Later in the day she feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. She does not experience any unusual discomfort.

Thursday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore. She feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. Upon inspection later that day she notices a slight redness in the same general area. She does not experience any unusual discomfort.

Friday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Saturday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Monday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Tuesday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Wednesday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Thursday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore. Later in the day she feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. She does not experience any unusual discomfort.
Friday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Saturday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.

Sunday: Upon awaking in the morning the person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
Monday: During the day the person checks her genital area and does not notice any visible signs of a herpes sore. Later in the day she feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. Upon inspection later that day she notices a slight redness in the same general area. She does not experience any unusual discomfort.

Tuesday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. Upon inspection she is unable to notice any visible signs of a herpes sore. However, she begins to notice a more visible redness just inside the left lip of her vulva. She does not experience any unusual discomfort.

Wednesday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. Upon inspection she is unable to notice any visible signs of a herpes sore. The area feels somewhat tender and she notices a slight swollenness in her lymph nodes in the groin area.

Thursday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present in the past. Upon inspection she notices in the center of the redness area several small blister-like bumps on the left inner lip of her vulva. The area feels very tender and she notices an increase in swollenness in her lymph nodes in the groin area.

Friday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores were present the day before. Upon inspection she notices in the center of the redness area more blister-like sores left inner lip of her vulva. The area remains very tender and the swollenness in her lymph nodes causes considerable discomfort.

Saturday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores were present the day before. Upon inspection she notices in the center of the redness area even more blister-like sores on the left inner lip of her vulva. The area remains very tender and the swollenness in her lymph nodes still causes considerable discomfort.

Sunday: The person again feels an itching and tingling sensation on the left inner lip of her vulva where herpes sores were present the day before. Upon inspection she notices in the center of the redness area the blister-like sores that are now crusted over on the left inner lip of her vulva. The area remains very tender and the swollenness in her lymph nodes has subsided but still causes some discomfort.

Monday: The person does not feel an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present. Upon inspection she notices in the center of the redness area the blister-like sores remain crusted over on the left inner lip of her vulva. The area is now moderately tender and the swollenness in her lymph nodes causes only a very slight discomfort.
Tuesday: The person does not feel an itching and tingling sensation on the left inner lip of her vulva where herpes sores have been present. Upon inspection she notices in the center of the redness area that contains only two small blister-like sores crusted over on the left inner lip of her vulva. The area is now considerably less tender and the swollenness in her lymph nodes has disappeared without any discomfort.

Wednesday: The person again does not feel an itching and tingling sensation left inner lip of her vulva where herpes sores have been present. Upon inspection she notices only a slight redness and the two small blister-like sores are barely visible and only slightly crusted over on the left inner lip of her vulva. The area is only slightly tender, she notices no swollenness in the lymph nodes and experiences no physical discomfort.

Thursday: The person feels only a very slight tenderness on the left inner lip of her vulva where herpes sores have been present. Upon inspection she notices only a very slight redness and no obvious sores on the left inner lip of her vulva.

Friday: The person does not feel any tenderness on the left inner lip of her vulva where herpes sores have been present. Upon inspection she notices a slight red area and no obvious sores on the side left inner lip of her vulva.

Saturday: The person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak.

Sunday: The person checks her genital area and does not notice any visible signs of a herpes sore or any symptoms usually associated with an outbreak. The person checks again before going to bed and notices the same results.
INSTRUCTIONS FOR NUTRITIONAL ASSESSMENT FORM

The Computerized Nutrition Assessment form will be used to record the foods you eat for both three-day periods, one at the beginning of the study and the second at the end. Begin at the front of the form at the top and provide the requested information. Under the section I.D. Code Number, please use the last four digits of your social security number (or a four digit number that will be easy for you to remember). On all other forms, you will use this number as your identification.

Next, check the appropriate lines that pertain to you under Health History Profile. In addition, list any medication you are currently taking including any vitamin or mineral supplements and the purpose.

(Present the Diet Record Form and How to fill out the Diet Record Form from the participant's packet) This form is where you will record the foods you eat for each three-day period; the first three-day period will be at the beginning of the study and the second at the end. Two days should be weekdays; the third should be a Saturday or Sunday. For each day write-in the date and check whether that day is a weekday or weekend day (Saturday or Sunday). Fill in your food choices and portions as accurately as possible at the times you eat. Waiting until the end of the day, then trying to remember, may make your assessment less accurate.

For each day record the food name and portion for each food. Portions may be listed by any unit of measure (e.g., cup, slice, item, etc.). If the same food is eaten more than once, record it only one time and increase the portion size. For example, if one apple is eaten at breakfast and another at lunch, enter Apple, Raw (under Complete Food Description) and 2 items (under Portion). If you are preparing a dish that contains several items, please weigh each ingredient before combining them and record the food description and portion for each item. Scales for weighing foods will be provided. In addition, if you do not have devices such as measuring cups and/or spoons, please inform the me (researcher) and they also will be provided. At the end of each nutritional assessment period, you are requested to mail the Computerized Nutritional Assessment form in the stamped and addressed enveloped provided. Also, if you any questions or concerns regarding the recording of this form, please feel free to contact the researcher at the phone number(s) provided.

I will now demonstrate the procedure of weighing foods with the scale and measuring cups and spoons. In addition, you have a sample food diary to view as an example of how to record the items in this demonstration. (Proceed with weighing demonstration)

At this point I will answer any questions or address any concerns with how to record the three-day food diary.
Appendix K

Instructions for The Hassle Scale
INSTRUCTIONS FOR THE HASSLE SCALE

The Hassle Scale form will be used to record hassles you may have experienced during the past week. Hassles are defined as irritants that can range from minor annoyances to fairly major pressures, problems or difficulties. They can occur few or many times.

Listed on the form in the center of the are a number of ways in which a person can feel hassled. First, circle the hassles that have happened to you in the past week. Then look at the numbers on the right side of the items you circled. Indicate by circling a 1, 2 or 3 how severe each of the circled hassles have been for you during the past week. As indicated under the direction key for Severity, the number 1 corresponds to "somewhat severe," the number 2 corresponds to "moderately severe" and the number 3 corresponds to "extremely severe." If a hassle did not occur in the last week do not circle. At the end of each week, you are requested to mail the The Hassle Scale form in the stamped and addressed envelope provided. Also, if you any questions or concerns regarding the recording of this form, please feel free to contact the researcher at the phone number(s) provided. Here is an example of The Hassle Scale form filled-out as an example.

Do you have any questions or concerns on recording this form?
Appendix L

Protocol Clearance from the Human Subject
Institutional Review Board
Date: October 21, 1991
To: Carmen Stark
From: Mary Anne Bunda, Chair
Re: HSIRB Project Number 91-09-05

This letter will serve as confirmation that your research protocol, "Nutrition, fitness, stress and genital herpes recurrences" has been approved after full review 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.

Cc: Burnette

Approval Termination: October 21, 1992

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Date: June 4, 1992
To: Carman Stark
From: Mary Anne Bunda, Chair
Re: HSIRB Project Number: 91-09-05

This letter will serve as confirmation that your research protocol, "Nutrition, fitness, stress and genital herpes recurrences" has been reapproved by the HSIRB. The conditions and duration of this reapproval are specified in the Policies of Western Michigan University. You must seek reapproval for any change in this design.

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

c: Burnette, Psychology

Approval Termination: October 21, 1993
Date: October 28, 1992
To: Carman Stark
From: M. Michele Burnette, Chair
Re: HSIRB Project Number: 91-09-05

This letter will serve as confirmation that your research protocol, "Nutrition, fitness, stress and genital herpes recurrences" has been reapproved by the HSIRB. The conditions and duration of this reapproval are specified in the Policies of Western Michigan University. You must seek reapproval for any change in this design.

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

Approval Termination: October 28, 1993
BIBLIOGRAPHY


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