

THE IMPACT OF WRITTEN DISCLOSURE
ON HYPERTENSION

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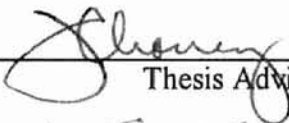
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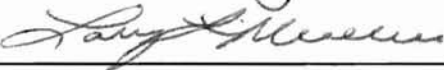
Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 2000

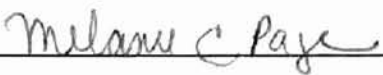
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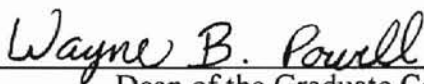
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ACKNOWLEDGMENTS

I would like to express my sincere appreciation to Susan Orsillo, Ph.D. for serving as my thesis chair during the development and implementation of this research study. Her ideas and guidance encouraged me to undertake the study, and she was a consistent source of sound methodological advice throughout the research process. I am also profoundly grateful to John Chaney, Ph.D. for serving as an additional thesis chair during the last stages of this project. His guidance and direction during the data analysis and final writing phases of the study were extremely valuable, and I am deeply indebted to him. Dr. Orsillo and Dr. Chaney also successfully demonstrated the balance between professional obligation and parental responsibility, and by doing so, served as positive models for myself.

I would also like to extend my thanks to the members of my thesis committee, Larry Mullins, Ph.D., Melanie Page, Ph.D., and Brian Marx, Ph.D., for their collaborative assistance and valuable suggestions during this study.

I would like to acknowledge and thank my parents, Marge and Dennis, for providing me with experiences that inspired curiosity and wonder. They both encouraged independent thinking and taught me the natural order of change, and I strive to honor their memory. I would also like to thank my two brothers, Steve and Pete, for their consistent support and acceptance throughout this process.

Most importantly, I would like to acknowledge and express my deep gratitude to my wife Cathy, for her immeasurable support throughout this entire process. Her patient and caring manner has sustained me through the difficult times. Lastly, I would like to thank my two beautiful sons, Ben and Mark, who were sources of daily inspiration. They continue to teach me how to meet the world with a questioning mind, and with Cathy, serve as tangible reminders that there is life to be valued outside the bounds of graduate school.

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CHAPTER I

INTRODUCTION

It is widely accepted that stressful or traumatic life events have the capacity to provoke both psychological and physical health problems in individuals who experience such events. The disclosure of thoughts and feelings associated with such an event is generally considered helpful in relieving psychological distress, and it is a component common to most forms of psychotherapy (Pennebaker, 1995). Further, in psychology it has been long held that the stifling or inhibition of such emotional expression may be detrimental to mental health and contribute to disease processes (e.g., Breuer & Freud, 1895/1996; Rachman, 1980; Scheff, 1979). Although correlational evidence supports the association between emotional inhibition and higher illness and mortality rates, such as early death due to cancer (Jensen, 1987), asthma (Friedman, Hall, & Harris, 1985), and cardiovascular disease (Johnston, 1985), there has been limited empirical study investigating the influence of emotional expression on physical and psychological health.

Recently a growing number of studies have examined the influence that disclosing traumatic experiences has on both physical and psychological health by experimentally inducing the disclosure process (e.g., Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Pennebaker, Kiecolt & Glaser, 1988). The majority of this research has been based on a relatively simple written disclosure paradigm (Pennebaker & Beall,

1986) and has resulted in consistent improvements in physical and mental health, and adaptive functioning as indicated by an array of both objective and self-report measures. However, the research conducted in this area has largely focused on the health effects of emotional disclosure in relatively healthy individuals. Few studies have applied the written disclosure paradigm to individuals suffering from chronic health problems. Given the support for an association between psychosomatic factors and various disease processes, examining the possible ameliorating effects of disclosure on the health in individuals suffering from chronic illness is logical.

Essential Hypertension (EH) is considered to be a chronic health problem that affects over 35 million Americans, and significantly contributes to risk of morbidity and mortality due to cardiovascular disease (Russo & Zuckerman, 1991). It is characterized by chronically elevated blood pressure of unknown etiology, as well as cardiovascular reactivity to interpersonal stressors (e.g., daily hassles). Psychosocial variables consistently associated with EH (e.g., suppressing emotional or behavioral responses, cynical hostility) suggest that individuals with EH may consistently inhibit their thoughts, feelings, and behavior in interpersonal contexts. The purpose of the present study is to apply a written disclosure task to individuals diagnosed with EH to examine the short-term physiological and mood effects and long-term health effects of emotional disclosure.

The following pages will include a comprehensive literature review of existing studies examining health improvement, and changes in physiological functioning related to emotional disclosure. Next a rationale will be presented for applying this paradigm to individuals with EH. Then the specific hypotheses, methods, and results of the study will

be described. Lastly, a discussion of how these finding fit into the broader context of written disclosure research will follow.

CHAPTER II

REVIEW OF LITERATURE

A number of non-experimental studies have demonstrated the correlation between the disclosure of stressful or traumatic life experiences, such as death of a spouse (Pennebaker & O'Heeron, 1984), Holocaust trauma (Pennebaker, Barger, & Tiebout, 1989), divorce, sexual assault, violence, and improved self-reported health (Pennebaker & Susman, 1988). Pennebaker (1982) suggested that individuals who experience a traumatic event may need to express their feelings about the experience with others in order to help them process and make sense of the experience. Unfortunately, some individuals (such as victims of sexual assault or perpetrators of crimes) may not disclose their significant experience due to shame or fear of legal action. In Pennebaker's (1982) view they must actively restrain their overt behaviors, thoughts, and feelings about the event. Pennebaker proposed that this inhibition induces cumulative physiological stress, which attenuates immune response and increases vulnerability to various stress-related disease processes. Pennebaker (1982) theorized that health should improve following trauma disclosure because such "disinhibition" should relieve the chronic physiological effort needed to restrain behaviors, thoughts, and feelings about the trauma.

To empirically evaluate how the disclosure of upsetting experiences influences physical and mental health, Pennebaker and his colleagues developed a disclosure

paradigm that has served as a template for more controlled studies of the phenomenon. This paradigm has been used with a variety of outcome measures variously aimed at assessing change in reported health, physiological functioning, health behaviors, psychological well being, and general functioning as a function of disclosure. Typically, research participants are randomly assigned either to a disclosure or control condition and compared on pre- and post-intervention outcome measures of health and well being. Disclosure condition participants are instructed to write or speak about their deepest feelings regarding an upsetting experience for 15 to 20 minutes on several successive days. Control participants are instructed to write or speak about a superficial topic for the same duration and frequency. Although there are some exceptions, the majority of these studies have found a health benefit of disclosure. A review of the major studies conducted in this area follows.

Health Improvement through Emotional Disclosure

Pennebaker and Beall applied the written disclosure paradigm in 1986 in a preliminary study designed to examine the short-term physiological and mood effects of writing about traumatic events, and whether writing could influence long-term health. College undergraduates were randomly assigned to write anonymously either about a trivial topic (control condition) or about a traumatic experience from their own life using one of three perspectives (experimental conditions). Participants in the three trauma writing conditions were asked to disclose 1) only their deepest feelings of the experience, 2) only the facts of the experience, or 3) both their deepest feelings and facts of the

experience. Participants in all four conditions wrote for 15 minutes on each of four consecutive days.

Both immediate and long-term outcome measures were used to determine the effects of written disclosure. Immediate measures included cardiovascular reactivity, self-report of current physical symptoms and current mood. Participants also rated the content of each of their essays on the degree that it was personal and emotionally revealing, and the extent that they had told others about the topic. Long-term outcome measures included pre-writing and four-month post-writing self-reported number of health center visits, number of days that activities were restricted by illness, health behaviors, and health problems. Objective information regarding number of visits to the student health center and student counseling center was collected for the three month period before the writing task and the six month period following the writing task.

As expected, all trauma condition participants rated their essays as significantly more personal relative to control condition participants, and those in the two trauma conditions requiring emotional expression rated their writing as significantly more revealing of their emotions. All participants experienced a blood pressure decrease both from pre- to post-writing and over the four writing sessions. However, participants in the two conditions requiring emotional expression in their trauma writing evidenced smaller blood pressure decreases from pre- to post-writing. No significant differences between groups emerged on pre- and post-writing self-reports of physical symptoms. An increase in self-reported negative moods from pre- to post-writing occurred in all trauma conditions.

Individuals disclosing both their feelings and the facts related to a personal trauma evidenced fewer health center visits during the four months following writing than any other condition. Participants who expressed emotion when writing about their event (i.e., the emotion-only and the emotion-fact groups) also reported significantly fewer health problems at the four-month follow-up relative to the fact-only and control conditions. However, no significant differences were found between conditions on change in health behaviors, suggesting that health improvement may result from some other process. No significant differences between conditions emerged on counseling center visits. However, only three participants visited the counseling center during the academic year of data collection, suggesting a floor effect. These overall results provide compelling support for the notion that disclosure of an individual's deepest thoughts and emotions regarding traumatic experiences is associated with better health.

One shortcoming of the Pennebaker and Beall (1986) study was that it did not address whether health improvements from trauma disclosure were related to disclosure history of the disturbing event (i.e., were events previously disclosed versus previously held back) or the severity of the trauma reported. Greenberg and Stone (1992) attempted to replicate the findings of Pennebaker and Beall and to investigate whether these were mediating factors influencing immediate mood and long-term health. Greenberg and Stone theorized that individuals who disclose a previously held back traumatic event should experience greater health benefit from disclosure than those who have already shared their experience with others. Given Pennebaker's (1982) inhibition perspective, more physiological effort must be expended to suppress the behaviors, thoughts, and feelings related to an event that has been previously held back. Likewise, Greenberg and Stone

suggest that individuals disclosing trauma experiences of greater severity should experience greater health benefit due to the greater physiological effort required to inhibit these experiences.

Over four consecutive sessions, college undergraduates were randomly assigned to one of three conditions in which they were required to write about 1) a trivial topic (control condition), 2) a previously disclosed trauma (first experimental condition), or 3) a previously undisclosed trauma (second experimental condition). Immediate outcome measures included self-reported physical symptoms, current mood, and mood over the prior month. Participants also rated the content of each of their essays on the degree that it was personal and emotionally revealing, and the extent that they had told others about the topic. Self-reported health was assessed retrospectively for the month prior to writing and at one and two month intervals following writing. An objective measure of health (number of health center visits) was also collected for these time intervals. Participants who wrote about traumatic events were divided into either severe trauma or nonsevere trauma groups based on a median split of participants' subjective ratings of trauma severity averaged across the four writing days.

As expected, individuals in both trauma-disclosure groups rated their writing as more personal, meaningful, and emotionally revealing relative to those writing about trivial topics. Additionally, both trauma-disclosure groups reported an increase in negative mood and physical symptoms immediately following the writing task as compared to control subjects. There were no significant differences between any group on positive mood immediately following the writing task, and long-term mood was likewise unaffected by group. However, Greenberg and Stone (1992) failed to replicate the overall health effects

from the written emotional disclosure of traumatic experiences found by Pennebaker and Beall (1986). Specifically, no significant differences emerged between the three groups on long-term symptomatology or a combined measure of both objective health center visits and self-reported visits to private physicians for illness.

Greenberg and Stone (1992) proposed several possible explanations for this lack of overall health effects. First, the manner in which health care utilization was assessed was different than in previous written disclosure studies. Many Stony Brook students were commuters and it was likely the student health center was not their sole health care provider. To account for this, Greenberg and Stone summed both objective university health center visits and subjective self-reported visits to private physicians in order to serve as the long-term measure of health. Due to its subjective component, it is possible that this index of health change was at least partially vulnerable to memory bias. Additionally, it is unclear whether random assignment to condition was successful because significant differences in pre-writing physical symptoms were found between the control and trauma-disclosure groups. Although Greenberg and Stone attempted to control for these pre-test differences by using an analysis of covariance, meaningful health outcome comparisons between groups may have been compromised. Pre-study level of participant illness (as indexed by medical visits) may have masked beneficial effects resulting from the experimental manipulation.

Other investigators have examined whether the written expression of thoughts and feelings about non-traumatic yet stressful experiences facilitates coping with those stressors. Pennebaker, Colder, and Sharp (1990) applied the written disclosure paradigm to a sample of college freshmen during their first semester to examine the health effects of

writing about their transition to college. Pennebaker and his colleagues proposed that individuals who fully disclose their stressful college transition experiences through writing would exhibit improved health as compared to controls writing about superficial topics. Participants in each condition wrote for 20 minutes on each of three consecutive days. One fourth of the participants wrote in each of the 1st, 5th, 9th, or 14th week of classes in order to assess the effects of writing at different points during the transition to college. Participants completed follow-up questionnaires from four to eight months following writing, depending upon the week of their writing.

Outcome measures were obtained before writing and at four-month follow-up, and included self-reported psychological adjustment to college, health behaviors, and objective number of illness visits to the student health center. College grade point average for the first and second semesters were collected, controlling for college entrance examination scores. Self-reported perceptions about the experiment (e.g., overall value of the study, extent that the experiment influenced their moods) were obtained at the end of the fall and spring semesters.

As predicted, participants in the disclosure condition had fewer health center visits during the five months following writing than controls. Although overall differences in illness visits between conditions remained significant for each wave of participants, this difference significantly decreased during the five months following writing. This finding suggests that the positive effects of writing may be enhanced when the writing is proximal to the stressor. Consistent with previous studies (e.g., Pennebaker & Beall, 1986), no significant differences emerged between conditions for changes in health behaviors. Participants in the experimental group showed a trend of maintaining their grade point

average from the first to the second semester, relative to controls. Individuals who wrote about coming to college experienced a decline in psychological adjustment (specifically homesickness and general negative affect) from the beginning to the end of the semester, relative to control participants as measured by the College Adjustment Test (CAT; Fisher, Murray, & Frazer, 1985). However, these same individuals also reported thinking more about what they had written, believing that the experiment had more positive long-lasting effects for them, and believing that the experiment was more valuable and meaningful for them, compared to control participants. These seemingly incongruent results could suggest that writing about an ongoing stressor may have somewhat different effects than writing about past traumatic experiences. Disclosure of feelings surrounding current negative events may impact health and facilitate longer-term insight into the experience, but may not alleviate the immediate negative emotion inherent to the experience.

Written disclosure has also been utilized as a means to facilitate adaptive functioning following stressful experiences in non-academic settings. Spera, Buhrfiend, and Pennebaker (1994) applied the written disclosure paradigm to a sample of unemployed adults to determine if disclosure of feelings regarding a recent job loss could enhance adaptive coping and subsequent reemployment. Loss of employment, although not traumatic, may still be considered a very difficult experience that can provoke strong emotions. An individual may be less likely to discuss these feelings with others due to their embarrassment or humiliation about the termination. Spera and her colleagues sought to determine if broader adaptive benefits could result from processing the thoughts and emotions associated with personal upheavals such as job loss.

Participants were former employees of a large computer and electronics firm who had held engineering or other professional positions. Individuals had an average of 20 years of tenure with the company prior to termination. Participants were asked to write about their deepest feelings related to their job (experimental condition), or a superficial topic (control condition) for 20 minutes on each of five consecutive days, or they were assigned to a non-writing control group. Dependent measures included a self-reported health questionnaire (assessing which of 70 health problems they had experienced during the previous year), the Pennebaker Inventory of Limbic Languidness, and a transition-search behavior questionnaire (assessing job search activity, motivation, anxiety levels, and several items assessing current health behaviors). Blood pressure and heart rate data were collected before the first writing session, and 12 days following the final writing session. Additionally, self-reports of number of job-related phone calls received and letters to potential employers generated by participants were collected. Participants returned for monthly follow-ups over the three months after writing.

Spera and colleagues (1994) found that individuals who expressed their thoughts and emotions about their job loss and how it affected their personal and professional lives, were significantly more likely to find employment in the months following writing relative to writing and non-writing controls. Results from the pre-writing transition-search behavior questionnaire indicated no significant between group differences in motivation level. Physiological data was not significantly correlated with subsequent employment. There were no significant between group differences in health behaviors, however individuals in the disclosure condition reported drinking less alcohol in the six weeks following the study than control participants. These findings suggest that unemployed

professionals who address their negative thoughts and feelings related to their termination may gain a more adaptive perspective and the assimilate the experience more readily. ^{trauma} Spera and her colleagues suggest that this cognitive reappraisal of the experience by an individual may allow for qualitative enhancement of their subsequent employment search.

Several earlier studies have focused on the role of emotional expression on broader psychological and emotional change by making experimental comparisons between written disclosure and psychotherapy. Murray and colleagues (1989) randomly assigned college undergraduates to one of three experimental conditions: 1) a written trauma-disclosure condition, 2) a trivial writing control condition, or 3) a psychotherapy condition that used an empathetic approach to focus on feelings regarding a traumatic event, and encouraging a deeper understanding of the event. Participants attended two 30-minute sessions two days apart, completed pre- and post-session measures of mood, and had their blood pressure and heart rate measured. A post-experimental questionnaire assessed emotional parameters regarding the disclosed event. Tape recordings from the psychotherapy condition and writings from the written disclosure condition were rated by an independent judge (with a sub sample rated by another judge as a reliability check) along five dimensions using a 7-point scale 1) negative emotion expressed, 2) tension change during session, 3) extent that the material showed positive cognitive changes about the event, 4) extent that material showed feeling better about oneself, 5) extent that material reflected a change in problem solving or adaptive behavior. Long-term outcome measures given at a six-month follow-up included self-reported health, self-reported physician visits, and objective health center visits for the six-month period before and after participation.

No significant differences in self-reported or objective physician visits were found between the three conditions, although, consistent with previous findings there was a trend for written trauma disclosure participants to report fewer physician visits and fewer days restricted due to illness than participants in the other two conditions. Congruent with previous findings written disclosure aroused immediate negative affect. Participants in both the control and psychotherapy groups evidenced a slight decline in negative affect from pre to post-session. Participants in the verbal expression condition were significantly more likely to endorse that participation in the study had changed their feelings about the event. Analysis of autonomic measures yielded no consistently significant results.

In a conceptual extension of the Murray, Lamnin and Carver (1989) study, Donnelly and Murray (1991) investigated whether cognitive, affective, and health change resulting from written disclosure was comparable to those resulting from psychotherapy given a greater number of sessions. Participants were randomly assigned to a written trauma-disclosure condition, a trivial writing condition, or a psychotherapy condition where a therapist reflected and reframed the emotional content of the verbal trauma disclosure with empathy. Dependent measures included pre- and post-session mood, self-reported emotional change following the final session, and a self-report health questionnaire assessing health care utilization during the previous three months, given before participation and at three-month follow-up.

There were no group differences in long-term physical health as measured by self-report. However, low overall frequency of health care utilization for all groups (mean physician visits for every group was $< .7$ visits) may indicate a floor effect. The two treatment groups did not significantly differ from each other on experimenter-rated

positive or negative emotion expressed, but both treatment groups expressed significantly more positive and negative emotion relative to controls. Consistent with previous findings, written disclosure resulted in consistent increases in self-reported pre- post-session negative mood and consistent decreases in pre- post-session positive mood. However, disclosure in psychotherapy resulted in decreases in negative mood and increases in positive mood. These differences may be attributable to the social feedback to trauma disclosure in the context of psychotherapy.

In an attempt to further understand the role of disclosure in enhancing health, Greenberg, Wortman, and Stone (1996) used a written disclosure task with female college students who were all pre-selected for having experienced a childhood or adolescent trauma. Only female participants were used to avoid possible confounds due to gender differences in emotional expression. Greenberg and her colleagues suggest that a strict disinhibition model is not sufficient to explain the broad health effects that have been associated with disclosure, and that habituation or cathartic processes might better explain the phenomenon. To test this idea, participants were randomly assigned to write for 30 minutes during a single session about 1) their feelings regarding a traumatic event that they had actually experienced (real-trauma), 2) their feelings generated by imaginative immersion in a traumatic event that they had never experienced (imagined-trauma), or 3) their everyday surroundings (control condition). Greenberg and her colleagues proposed that since individuals in the imagined trauma group had no previous experience with their given trauma, any health effects resulting from writing must be due to some process other than disinhibition.

Outcome measures included self-reported mood and physical symptoms, which were assessed at pre and post-writing and at four weekly intervals following writing. Pre and one-month follow-up measures of self-reported psychological symptoms, self-reported intrusion and avoidance of trauma related thoughts, and objective physician visit data were also collected. Congruent with previous disclosure studies, trauma-disclosure participants (both real and imagined) evidenced significant elevations in negative mood and reductions in positive mood immediately following writing relative to control participants. However, both real-trauma and imagined-trauma disclosers made significantly fewer visits to their physician for illness in the month following writing relative to control group participants. Further, real-trauma disclosers evidenced a significant decrease in self-reported upper respiratory symptoms over the four-week follow-up period relative to control participants. These findings expand upon the previous research on the positive health effects of trauma disclosure. However, the long-term psychological effects of the written disclosure task were not as definitive. Real trauma disclosers reported significantly more avoidance and fatigue at the one-month follow-up than both the control and imagined trauma groups, although no further group differences emerged regarding long-term psychological adjustment. Greenberg and her colleagues suggest that real-trauma participants may have been exposed to too high a dose of their traumatic memories, resulting in compensatory mental controls (e.g., avoidance) following disclosure.

The disinhibition model does not readily explain the finding that disclosure of an imagined traumatic event can enhance health since those events could not have been subject to prior inhibition. Greenberg and her colleagues (1996) suggest that health improvement in the imagined-trauma group may be mediated by enhanced emotional

regulation. In other words, these individuals may have experienced an increase in emotional awareness and acceptance through the imaginative immersion task. By developing perceptions of self-control during aversive affective arousal, they may have strengthened beliefs of self-efficacy and established a more resilient representation of themselves. It is possible that two distinct processes are responsible for these observed health effects of trauma disclosure in this study, although no definitive conclusions can be made about the mechanisms underlying these health effects without further study.

Some researchers in this area (e.g., Pennebaker, Colder, & Sharp, 1990; Greenberg, Wortman, & Stone, 1996) have suggested that cognitive factors such as insight attainment or perceptions of emotional self-efficacy may play an important role in observed health improvement following disclosure. In 1996, Pennebaker and Francis sought to distinguish possible cognitive and linguistic factors contributing to the health effects of emotional disclosure. Pennebaker and Francis suggest that written disclosure may enhance health through organizing a traumatic event into a linguistic structure allowing for better assimilation of the facts and feelings related to the experience.

To investigate the how linguistic structure is associated with disclosure, Pennebaker and Francis (1996) randomly assigned college undergraduates to write about either trivial topics or their thoughts and feelings regarding their experiences of coming to college. Participants wrote for 20 minutes each day over three consecutive days. Outcome measures included several categories of data: 1) objective and self-reported long-term health and academic changes, 2) laboratory-based cognitive measures (reaction time and thought generation tasks), and 3) linguistic dimensions of written essays. As with previous studies, individuals who wrote their thoughts and feelings about coming to college made

significantly fewer health center visits during the two-month follow-up period than those who wrote about trivial topics. Likewise, those writing about the college experience evidenced a significant increase in grade point average from first to second semesters relative to control participants. Laboratory-based cognitive measures yielded no conclusive results.

The most compelling findings from this disclosure study resulted from a linguistic analysis of text variables in the written essays. A computer program was developed and utilized to analyze linguistic features of each essay and count the number of words belonging to several dozen linguistic categories. These categories fall into three broad variables: 1) emotion processes [e.g., positive emotion words (laugh, happy) or negative emotion words (angry, sad)], 2) cognitive processes [e.g., insight-related words (understand, realize) or causal-related words (reason, cause)], and 3) linguistic factors [e.g., word count, word length, self-references (I, me our)]. Group differences in essay content of emotion and cognitive processes was considered a manipulation check, given the different writing instructions. In analyzing group differences in linguistic variables, Pennebaker and Francis (1996) found that experimental participants wrote significantly more and shorter words, and included more self-references and negations relative to control participants. Health improvement in those writing about coming to college was predicted by use of more positive emotion words and an increase of insight and causal words over the three writing days. These results suggest that organizing upsetting experiences into a coherent narrative through writing may allow for a better understanding of the experience and facilitate its assimilation and thereby enhance health. (Pennebaker & Francis, 1996).

Emotional Disclosure and Physiological Functioning

Related approaches to the study of disclosure have included investigations into the autonomic correlates of emotional disclosure, comparisons between degree of disclosure, and the influence of emotional disclosure on immune functioning. Pennebaker, Hughes, and O'Heeron (1987) investigated disclosure characteristics and short-term physiological response of college undergraduates to trauma disclosure. In one experiment, subjects spoke into a tape recorder about both a personally traumatic experience and a trivial topic. Physiological measures of skin conductance, blood pressure, and heart rate were collected and independent judges rated the narratives on a number of disclosure characteristics. A median split was performed such that participants were classified as high disclosers and low disclosers on the trauma narratives based on judged levels of personal or stressful material in their trauma recordings.

Cardiovascular activity was higher during trauma disclosure than during the trivial task. Further, high disclosers evidenced significantly larger drops in systolic blood pressure following trauma disclosure. High disclosers were also found to have lower skin conductance levels (SCL's) than low disclosers while talking about upsetting traumatic events than trivial topics. This result is congruent with the idea that electrodermal activity increases when behavior is restrained (Pennebaker & Chew, 1985), since emotional disclosure would be viewed as disinhibition.

In a second experiment, Pennebaker, Hughes, and O'Heeron (1987) compared both speaking and thinking about a traumatic event and a trivial topic (within subjects condition), and either speaking into a tape recorder or to an anonymous confessor

(between subjects condition). Subjects were again classified as high or low disclosers. Results parallel to experiment one were found, although an interesting interaction effect emerged when disclosure occurred in the social context of a confessor. Individuals who disclosed their traumatic event to an anonymous confessor showed less emotional speech (e.g., less crying) and greater SCL's than those who disclosed into a tape recorder, suggesting that they may have been attempting to inhibit their behavior during the disclosure.

Reliable changes in immunological function have been well linked to psychosocial distress, with greater distress being associated with poorer immunocompetence (Kiecolt-Glaser & Glaser, 1986). In an effort to observe the health effects of emotional disclosure with less reliance on self-report, Pennebaker, Kiecolt-Glaser, and Glaser (1988) used immune response (T-lymphocyte proliferation) as an objective measure of health. Healthy college undergraduates were asked to write for 20 minutes on each of four consecutive days about either a personally traumatic event or a trivial topic. Long-term outcome measures included five-month pre-study and six-week follow-up numbers of health center visits, and immune assays performed at pre-study, post-study, and six-week follow-up. Participants completed measures of self-reported mood and physical symptoms before and after writing each day. At three-month follow-up participants were assessed using a measure of self-reported subjective distress and self-reported health behaviors. Autonomic measures of blood pressure, heart rate, and skin conductance level were collected approximately one hour before writing on day one and immediately following writing on day four. These autonomic measures yielded no significant results. However, this may be a

function of collecting only two measurements at different temporal proximities to the writing task.

Congruent with the Pennebaker and Beall (1986) study, trauma disclosers experienced significantly more physical symptoms and a greater increase in negative mood than controls immediately following writing each day. Trauma disclosers also evidenced a significant drop in health center visits following writing relative to control subjects. Additionally, participants who disclosed a traumatic experience evidenced a significantly greater proliferation of T-lymphocytes controlling for baseline levels relative to control participants, suggesting enhanced immune function following emotional disclosure. Trauma disclosers wrote more about topics that were previously inhibited, were more personal, and had more words, self-references, and emotion words than control subjects' essays. Trauma disclosers rated the experiment as a more positive and meaningful experience than control subjects although they did not significantly increase health behaviors as a result of the experiment, similar to previous findings. A median split was performed on trauma disclosers based on self-ratings of the degree that participants had previously held back from discussing their experience with others. Pennebaker, Kiecolt-Glaser, and Glaser found that participants who disclosed a trauma that they had actively held back from telling others were likely to benefit more (e.g., more improved immune response, greater decline in blood pressure) from disclosure than participants who had not inhibited themselves from telling others about their traumatic experience.

In a similar study, Esterling, Antoni, Fletcher, Margulies, and Schneiderman (1994) examined the effects of both written and verbal emotional disclosure on immune response. Esterling and his colleagues examined the reactivation of a latent viral pathogen

(i.e., Epstein-Barr virus, EBV) in response to disclosure of stressful experiences. EBV is a human herpesvirus that is extremely prevalent in the general population, with primary infection occurring typically during adolescence and often without clinical signs. EBV antibody titers may be used as an index of immune system efficiency (with higher EBV antibody titers suggesting poorer immunological control of latent EBV). Healthy EBV-seropositive undergraduates were randomly assigned to one of three conditions: 1) audio-taped verbal disclosure of stressful events, 2) written disclosure of stressful events, or 3) a written trivial condition. Participants in each condition performed their given task for approximately 20 minutes on each of three weekly sessions. Immunological assays were performed on blood samples collected one week before session one and one week following session three.

Participants in both the verbal and written disclosure conditions evidenced significantly lower EBV antibody titers over a one-month period than participants in the trivial control condition. EBV antibody titers were significantly lower in the verbal disclosure group than in the written disclosure condition, which in turn had significantly lower EBV antibody titers than the control condition. A hierarchical regression model was used to determine predictors of EBV antibody change. As expected, group assignment was the most significant predictor of EBV antibody change. Additional significant predictors included increases in the number of negative emotion words expressed, greater cognitive change, enhanced self-esteem, and seriousness of the event disclosed.

Lutgendorf, Antoni, Kumar, and Schneiderman (1994) similarly examined Epstein-Barr virus viral capsid antigen (EBV-VCA) titers before and after a stressor disclosure induction. Healthy college undergraduates were randomly assigned to either 1) disclose a

stressful or traumatic topic verbally with the experimenter, or 2) undergo an assessment-only control condition (completing questionnaires at intervals equivalent to the experimental condition). Participants met with the experimenter weekly for 20-minute each session. In session one of the stressor induction condition, the experimenter gave verbal responses designed to increase emotional involvement in the disclosure. These participants were also given exercises to further increase their emotional involvement in the disclosure task at the beginning of sessions two and three.

No significant differences in EBV-VCA titers were found between the two groups. However, post-experimental analyses indicated that participants assigned to the control condition had significantly higher EBV-VCA titers at baseline relative to participants in the experimental condition, suggesting that the randomization procedures were inadequate. Although the between group difference in baseline antibody levels precluded causal interpretation, further within group analysis of individual differences in the disclosure condition yielded promising results. Greater experimental involvement and rating disclosure topic as more important were both significantly associated with greater decreases in EBV-VCA antibody titers. Additionally, greater decreases in cognitive avoidance of the disclosed event were significantly associated with greater decreases in EBV-VCA antibody titers and with lower antibody titers at the end of the study after controlling for baseline antibody titers. A hierarchical multiple regression resulted in greater than 75% of the variance in antibody change scores accounted for by 1) cognitive avoidance scores, 2) time since the disclosed event occurred, and 3) baseline antibody levels.

Although studies using EBV antibody change as an outcome measure support the association between disclosing disturbing experiences and health improvement, it is not known whether the changes to these immune parameters are at the center of any physiologically significant health consequences. In an effort to use an objective immunological measure that would indicate that significant direct influence on health improvement, Petrie, Booth, Pennebaker, Davison, and Thomas (1995) examined the effects of disclosure on response to a Hepatitis-B vaccination program. Infection with the Hepatitis-B virus is a major public health problem and may result in the development of acute or chronic hepatitis. Vaccination against the virus results in a Hepatitis B antibody response for approximately 90% of healthy adults. Research has demonstrated that psychological factors such as perceived stress and anxiety can influence antibody response to Hepatitis B vaccination. For example, Glaser and his colleagues (1992) found that higher Hepatitis B antibody levels following vaccination were significantly associated with lower levels of perceived stress and anxiety in medical students.

Petrie and his colleagues asked healthy medical students to write either about their most traumatic life experience or trivial topics over four consecutive days. Short-term outcome measures included skin conductance level during writing, and pre- and post-session self-reported mood and physical symptoms. Writing content for each session was analyzed using the same specialized computer program described in Pennebaker and Francis (1996). Immunological measures were performed on blood collected one day following the fourth writing session (immediately prior to vaccination), immediately before the one and four month booster vaccinations, and at a six-month follow-up.

Participants who disclosed their feelings surrounding a traumatic experience developed significantly higher levels of Hepatitis B antibodies following vaccination than those who wrote about trivial topics. Consistent with previous findings, trauma-disclosing participants reported significantly higher scores on negative mood measures immediately following writing. Trauma-disclosers endorsed significantly higher scores for the physical symptom of “pounding heart,” and evidenced a significant drop in skin conductance level over the four days relative to participants writing about trivial topics. Analysis of text variables yielded highly significant differences between the writings of each group, with trauma-disclosers higher in the use of words expressing negative emotion, anxiety, and depression. Trauma-disclosers were also significantly higher in the use of words belonging to the categories of insight, causation, and acceptance. Although a singular antibody response cannot fully represent the complexity of immunological efficiency, these results suggest that emotional disclosure could be important in stimulating the immune response of both healthy participants and those with marginally compromised immune systems.

In a similar study examining immune reactivity to emotional disclosure, Booth, Petrie, and Pennebaker (1997) randomly assigned medical students to write either about their feelings regarding a personal traumatic event, or a trivial topic. Participants wrote for 20 minutes on each of four consecutive days. Numbers of circulating blood lymphocytes was used as an index of immune response. Immediate outcome measures included self-reported mood and physical symptoms. Blood samples for immunological assays were collected on the day following the fourth writing day, and also one, four and six months later.

Disclosure participants experienced significantly greater negative moods, less positive moods, and more physical symptoms following writing as compared to control participants. There were also significant between group differences in circulating lymphocyte number, with control participants exhibiting a general post-writing increase relative to disclosure participants who exhibited little change in circulating lymphocyte number. This finding was counter to existing research supporting short-term attenuation of immune function concomitant with a variety of environmental and experimental stressors (Kiecolt-Glaser & Glaser, 1986; Kiecolt-Glaser & Glaser, 1992; Futterman, Kemeny, Shapiro, & Fahey, 1994). Booth and his colleagues suggest that disclosure induced stress may have lasted less than 24 hours, and that the beneficial effects of writing may have overridden these temporary immune changes. Booth and his colleagues further theorize that the unexpected increase in circulating lymphocyte number of the control group may reflect typical seasonal variation against which the disclosure group was buffered. Although increased circulating lymphocyte number is generally considered a positive influence on overall immunity, Petrie and his colleagues (1995) found that *stable* levels of circulating lymphocytes may be more indicative of immunological health.

In addition to efforts to operationalize health improvement through assessment of immunological parameters, some research has examined metabolic indicators of physical health. Francis and Pennebaker (1992) randomly assigned healthy university employees to write for 20 minutes once a week for four weeks either about their thoughts and feelings regarding a personal trauma, or about trivial topics. Dependent measures included work absenteeism rates, mood prior to participation and at six-week follow-up, and blood assays performed on samples taken prior to participation and at six-week follow-up. These

assays included 23 separate biochemical measures of cardiovascular functioning, liver functioning, and other indices of metabolic functioning (e.g., triglycerides, cholesterol levels).

Participants in the trauma disclosure group evidenced a significant drop in absenteeism rates from before participation to during the writing phase of the study, relative to control participants. No long-term group differences emerged in negative mood. Trauma disclosers evidenced significant improvement for two parameters of liver functioning relative to control participants, namely: serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT). Although no significant group differences emerged on any of the other metabolic measures, participants in the disclosure group demonstrated greater improvement than controls on all of the blood measures, with the exception of cholesterol level.

Research on Emotional Disclosure Using Clinical Populations

Few empirical studies of the effects of disclosure on health have been performed on clinical populations. Forston (1991) sought to assess the possible immunological, physiological, and psychological benefits to hospitalized psychiatric patients of writing about traumatic experiences. Inpatient psychiatric patients who had no evidence of physical illness, substance abuse, or psychosis were randomly assigned to write either about a traumatic event (experimental condition) or a trivial topic (control condition). Participants wrote for 20 minutes on each of four consecutive days. Pre, post, and six-week follow-up measures of affect, physical symptoms, depression and anxiety were administered. Participants in the trauma-disclosure condition also completed measures of

understanding and rumination about their traumatic event. Additionally, heart rates, blood pressure, and immune assays were collected at the pre- and post-writing sessions.

Although total lymphocyte number of both groups decreased from pre-writing to post-writing, participants in the experimental condition evidenced significantly greater total lymphocyte number following the last day of writing relative to control participants. This decrease in total lymphocyte number across condition may be due to the chronic stress that could accompany psychiatric hospitalization. Forston suggested that the written trauma-disclosure task might have limited the decrease in total lymphocyte number in the experimental group. Trauma-disclosure participants also reported greater positive affect at the six-week follow-up relative to control participants, although no significant differences between conditions emerged for physiological measures, physical symptoms, depression or anxiety.

The written disclosure model was adapted by Kelley, Lemley, and Leisen (1997) to assess health effects in participants suffering from rheumatoid arthritis (RA) a systemic, autoimmune disease leading to joint inflammation, chronic joint pain, disability, and emotional disturbance. Because RA is associated with pain during manual tasks, experimental participants privately talked into a tape recorder about a trauma or upheaval in their lives rather than writing about it. Control participants described aloud into a tape recorder a set of neutral pictures. Both groups talked for 15 minutes on each of four consecutive days. Interestingly, a majority of participants in the disclosure condition talked about their difficulties with RA. Participants completed a pre, two-week post, and follow-up health measure sensitive to clinical change in arthritis and were given physical

examinations to assess joint condition. An immediate outcome measure of self-reported mood was completed before and after each talking session.

Congruent with prior literature, the disclosure group evidenced a significant increase in negative mood over the course of writing, whereas control participants evidenced a slight decrease in negative mood. Participants also showed a marginal trend of poorer overall functioning during the two-week period subsequent to writing. Emotional disclosure had no significant effect on pain or joint condition. However, three months following writing, the trauma group evidenced a significant reduction from baseline of physical dysfunction (e.g., mobility, walking, and hand and finger function), and affective disturbance relative to the control group as judged by the arthritis health measure and mood measure. Kelley, Lemley, and Leisen (1997) suggest that the beneficial influence of disclosure may have been diminished by the fact that many of the experimental groups' disclosure topics were not as emotionally intense and personal as those reported in previous studies.

In a similar study, Smyth and colleagues (1999) used the written disclosure model with individuals suffering from either asthma or rheumatoid arthritis to determine whether clinically significant symptom reduction was possible with these chronically ill populations. Participants were randomly assigned to write either about their most stressful experience or their daily plans for 20 minutes on each of three consecutive days. Outcome measures included disease activity indices taken at baseline, two weeks, four weeks, and 16 weeks. For participants with asthma, this consisted of a standard assessment of pulmonary function (i.e., one-second forced expiratory volume, or FEV₁, assessed by spirometry). Individuals with rheumatoid arthritis were assessed through a structured evaluation

completed by the treating rheumatologist, which required the physician to make global assessments of the patient's current clinical status.

Individuals with asthma who wrote about their emotions surrounding traumatic events evidenced significantly greater improvement in FEV₁ at the four month follow-up compared with control participants. Supplemental analyses indicated that these between group differences were also significant for the two week and four week follow-up periods, and that the observed improvement was consistent over the three follow-up periods. Individuals with rheumatoid arthritis who wrote about their emotions surrounding traumatic events also evidenced significant reductions in disease activity at the four month follow-up compared with control participants. However, similar supplemental analyses revealed that there were no between group differences at any of the other two follow-up periods.

Gidron, Peri, Connolly, and Shalev (1996) applied a standard written disclosure protocol to a small sample of trauma survivors exhibiting symptoms of posttraumatic stress disorder (PTSD). Fourteen participants were randomly assigned to write either about their most traumatic experience or about their casual daily agenda. All participants wrote for 20 minutes on each of three consecutive days. Following the third day of writing trauma-disclosers elaborated orally about the most severe trauma they wrote about, and casual writers described one daily activity orally. Mood measures were administered before the first writing session, after the third session, and at a five-week follow-up. The Impact of Events Scale (IES; Horowitz et al., 1979) was administered before the first writing session and at the five-week follow-up.

Consistent with previous findings, disclosure participants reported significantly greater state-negative affect after session three as compared to control participants. However, five weeks subsequent to writing, disclosure participants reported relatively larger increases in health care visits and IES avoidance symptoms relative to controls (who reported a slight decrease in both of these measures). A regression model (controlling for time since the trauma and baseline levels of health care utilization) showed that experimental condition significantly accounted for approximately one-third of the variance in change in health care utilization (pre to post), and approximately one-third of the variance of IES avoidance symptoms. Experimental condition did not significantly influence any other outcome measure. This finding is contrary to most of the disclosure literature studying healthy populations. Indeed the extent of emotional disclosure (i.e., number of emotional words) in writing was positively correlated with intrusive and avoidance symptoms at the five-week follow-up. Likewise, the extent of somatic focus in writing (i.e., number of words related to physical health) was positively correlated with health care utilization at the five-week follow-up. Several possible explanations exist for these results. Gidron and his colleagues suggest that one possibility is that disclosure participants did not utilize effective coping skills during the intense emotional response associated with disclosure of the traumatic event, and the writing task merely served to remind them of trauma details. There may be factors specific to PTSD that influence the generalizeability of the disclosure model. An exposure perspective would suggest that a relatively brief writing task (20 minutes per session) could be insufficient to deplete the conditioned aversive responses that an individual experiences, and a strengthening of those responses would be expected (Stern & Marks, 1973). This explanation would explain the

observed pre- to post-study increases of self-reported avoidance in the experimental condition. Given this possibility, Gidron and his colleagues suggest that longer sessions of written trauma-disclosure may be necessary to see health improvements in individuals with PTSD. Alternately, trauma memories may be too disjointed (due to memory disruption at the time of trauma) to allow for their effective reorganization into a coherent trauma narrative (Foa, Molnar, & Cashman, 1995).

Health care utilization may be of limited sensitivity as an outcome measure with this clinical population, due to possible floor effects resulting from the relatively brief five-week follow-up period. Although this study is limited by small sample size and subjective health outcome measures, these findings serve to underscore the importance of assessing methodological considerations of clinical populations carefully.

Recently, a meta-analysis of experimental studies using written disclosure paradigms was performed (Smyth, 1998) to examine moderator variables that could potentially influence health. To be included in the meta-analysis, disclosure studies had to: 1) include an experimental manipulation of written emotional disclosure, 2) use randomized assignment to condition, 3) have some outcome measure of health (i.e., physical, mental, or general functioning), 4) contain statistical information necessary to calculate effect size. An overall significant effect size of $d = .47$ ($r = .23$) was found for the written emotional expression task, and significant mean effect sizes for the following outcome types (measured at least one month post-writing) were found: reported health, psychological well being, physiological functioning, and general functioning. Although the written emotional expression task consistently produces a significant increase in pre to

post-writing distress, short-term distress was not predictive of any of the above mentioned health outcomes.

The relationship of quantity (i.e., dose) of written disclosure received and effect size was examined in three ways: the number of sessions of written disclosure (ranging from one to five), the duration of each writing session (ranging from 15 to thirty minutes), and the time spacing over which the sessions occurred (from one to 28 days). Number and duration of writing session was unrelated to effect size. However, studies with sessions occurring over longer periods of time had higher mean overall effect sizes. Effect sizes for psychological well being were greater for studies in which participants were told to write about current traumas. Being a student emerged as significantly related to effect size for the psychological well being outcome type. Gender ratio (i.e., % male) was also significantly related to overall effect size. Smyth (1998) found that the overall mean effect size for the written emotional expression task is comparable to other psychological treatments.

Summary

There exists a sound body of literature demonstrating that when relatively healthy individuals participate in structured emotional disclosure, they show significant improvement in areas of physical health, adaptive functioning, and psychological well being in the following months. Most studies have found that writing or talking about emotional experiences is associated with decreases in objectively measured physician visits for illness, enhanced immunocompetence, improved self-reported health and physical symptoms when compared to writing or talking about superficial topics. Furthermore,

improvements in mood, college grades, and time to reemployment following job termination have been found when participants disclose the feelings surrounding difficult experiences.

With the exception of a handful of studies using clinical populations, the majority of disclosure studies have used healthy, non-clinical populations. Future applications of the disclosure paradigm should include studies of populations of individuals with existing chronic health problems to determine if similar health enhancement is possible with these individuals. Written emotional expression may serve an important role in promoting the emotional processing and assimilation of negative experiences that individuals may not otherwise disclose due to shame, embarrassment, or other factors.

Essential Hypertension

Essential hypertension (EH) constitutes nearly 90% of all diagnosed cases of hypertension (Byrne & Caddy, 1992), and is characterized by chronically elevated blood pressure due to an unknown physiological cause (Elder, Geoffray, & McAfee, 1981). It is a major risk factor for coronary heart disease, cerebrovascular disease, and coronary artery disease (Russo & Zuckerman, 1991). Approximately 35 million Americans suffer from EH and it is estimated that less than 50% of those are on effective antihypertensive pharmacological regimens (Genest, Kuchel, Hamet, & Cantin, 1983). Further, research of treatment compliance (e.g., appointment keeping, medication compliance) suggest that approximately two-thirds of patients with hypertension are noncompliant (Dunbar-Jacob, Dwyer, & Dunning, 1991). The prevalence of EH combined with its relatively

symptomless presentation and inherent treatment difficulties make it a significant contemporary public health issue.

Psychosocial Variables and Hypertension

The strong association between personality variables and hypertension has been well-supported (Jorgensen & Houston, 1988; Helmers & Krantz, 1996; Larson & Langer, 1997). These variables include various anger-related constructs such as trait anger (Suls, Wan, & Costa, 1995), anger expression (Goldstein, Edelberg, Meier, & Davis, 1988; Vandervoort, Ragland, & Syme, 1996; Larson & Langer, 1997), and cynical hostility (Pope & Smith, 1991; Christensen & Smith, 1993). Empirical evidence has supported a strong association between hostility and increased cardiovascular reactivity (e.g., the magnitude of physiological response) during discrete stressors, particularly interpersonal conflict (Houston, Smith, & Cates, 1989). Additionally, greater cynical hostility has been linked to increased adrenocortical activity during daily activities, further suggesting that these participants experience an exaggerated physiological response to routine stressors (Pope & Smith, 1991).

Sommers-Flanagan and Greenberg (1989) described several factors associated with the “hypertensive personality”, namely: 1) difficulty identifying and expressing anger and hostility, 2) a tendency to experience anxiety and physiological arousal during interpersonal communication, and 3) a defensive style that focuses on the production of socially desirable responses (or reluctance to disclose personal information). Such individuals may dislike or mistrust others, but will attempt to suppress the overt expression these feelings to avoid provoking interpersonal conflict or alienating those

upon whom they rely for social support (Houston, Smith, & Cates, 1989). It is theorized that habitual inhibition of these strong cognitive, emotional, and behavioral reactions results in chronic sympathetic activation, which may contribute to the development of EH (Jorgensen et al., 1996).

Given the possible tendencies for individuals with hypertension to give socially desirable responses or withhold personal information (Cumes-Rayner & Price, 1989; Saxena, 1982), specific treatment difficulties arise such as inaccurate symptom reporting (Lee et al., 1992). Additionally, greater levels of hostility in hypertensive individuals have also been associated with poorer medication compliance and greater reported symptoms due to the medication, however limited evidence suggests that individuals high in hostility evidence the greatest decline in blood pressure from medication (Lee et al.). Regardless of form of treatment, consideration of the psychosocial variables associated with EH is essential to insure effective treatment.

Treatment of Essential Hypertension

Traditional Medical Intervention – Pharmacological control and treatment of EH has been a primary focus of medical intervention, and pharmacotherapy has been shown to reduce mortality and morbidity resulting from moderate to severe EH (Wadden, Luborsky, Greer, & Crit-Christoph, 1984). However, it is estimated that only approximately 34% of hypertensive individuals are able to gain control of their hypertension through medication (Byrne & Caddy, 1992). Pharmacological management of hypertension is not wholly effective due to the effects of compensating physiological processes that serve to cancel out the forced changes resulting from medication. Additionally, high medication

noncompliance is frequently due to unpleasant physical side effects of the medication, including impotence, insomnia, fatigue, lethargy, and glucose intolerance (Pitts & Phillips, 1991). Further, although medication is generally effective in reducing mortality and morbidity due to hypertension when patients are compliant, pharmacological interventions do little to impact the psychosocial factors associated with and contributing to hypertension (e.g., hostility, health behaviors).

Behavioral Interventions for Essential Hypertension – While nonpharmacological treatments for essential hypertension have generally been viewed as serving a supplementary role to medical intervention, some behavioral interventions have shown effectiveness in treating mild hypertension when used alone. Further, beneficial effects derived from nondrug treatments may be additive when used in conjunction with direct medical intervention (Genest, Kuchel, Hamet, & Cantin, 1983). Given the large number of individuals who require long-term treatment and the psychosocial factors that are possibly associated with EH, these supplementary treatment methods have received considerable attention.

Behavioral treatment methods have been applied to essential hypertension in three principal ways. These include methods directed at 1) reducing physical risk factors associated with hypertension (e.g., weight reduction, dietary factors), 2) influencing blood pressure directly (e.g., biofeedback), and 3) reducing sympathetic discharge in the autonomic nervous system (e.g., biofeedback combined with relaxation), (Byrne & Caddy, 1992). Methods directed at lifestyle modification (i.e., changing health behaviors) in the areas of diet, weight management, physical exercise and moderation of alcohol have been

associated with moderate reduction of overall cardiac risk and improved quality of life (Rosen, Brondolo, & Kostis, 1993).

Given the possible associations between EH and psychological constructs such as stress reactivity and personality, research efforts have been directed at incorporating these individual difference factors into other behavioral treatments (Jorgensen, Johnson, Kolodziej, & Schreer, 1996). The two principal treatment approaches that have been utilized with essential hypertension are cardiovascular biofeedback and relaxation/stress management. Biofeedback approaches assume that individuals may be trained to control visceral responses, such that blood pressure is directly influenced during times of high reactivity (Johnston, 1985). An additional combined method, broadly termed stress management, uses relaxation techniques to achieve a reduction of sympathetic discharge, in conjunction with other behavioral techniques to address some of the psychosocial and physical risk factors for developing hypertension. Both behavioral interventions usually involve a training period of weekly sessions over about one to three months to learn the various techniques and daily practice of the techniques.

In a review of the efficacy of such treatments, Wadden, Luborsky, Greer, and Crits-Christoph (1984) found that various forms of behavioral treatment provide comparable results, that they are superior to no treatment or nonspecific attention-control methods, but that they are not as effective as pharmacological treatments. Biofeedback methods as applied to hypertension are exceptions to this, resulting in blood pressure reductions of modest to little clinical value (Johnston, 1985; Pitts & Phillips, 1991). In a meta-analysis of stress-management based treatments used with individuals with mild hypertension, Kaufmann and colleagues (1988) found that nonmedicated patients evidenced

modest decreases in blood pressure, but that this improvement disappeared at a one-year follow-up. Notably, individuals with higher blood pressures tended to show the greatest benefit from such interventions (Kaufmann et al., 1988; Johnston, 1985; Jacob et al., 1991).

Disclosure and Hypertension

Although there has been little empirical research examining the beneficial effects of disclosure on clinical populations, a small number of non-experimental studies have found intriguing relationships between disclosure and hypertension. In a case study report Mann and Delon (1995) described a 49 year-old woman with essential hypertension who experienced a dramatic and sustained improvement in blood pressure in the 18 months following her disclosure of a rape trauma that occurred when she was 14 years old. The woman initially complained of having intrusive nightmares to her physician, and she subsequently disclosed the traumatic event. Her immediate autonomic response to the disclosure (i.e., blood pressure increase) was similar to that observed in controlled studies of emotional disclosure (Pennebaker & Beall, 1986).

In an effort to determine whether individuals with EH differed from healthy individuals in the degree that they disclose personal information Handkins and Munz (1978) asked hypertensives to discuss topics of both high and low intimacy in a personal interview. Participants completed Jourard Self-Disclosure Questionnaire prior to the interview to assess perceived prior disclosure for personal information to certain target individuals and the Perceived Stress Index as a baseline measure, and at pre- and post-interview. During the taped interview, participants were confronted with six topics from

the Jourard Self-Disclosure Questionnaire. An independent judge then analyzed interview tapes. Individuals with EH were found to disclose significantly less personal information when responding to high intimacy topics than to low intimacy topics relative to healthy individuals, who showed no differences in degree of personal information disclosed on both topics. Additionally, there were no differences between groups in the amount of perceived disclosure to significant target persons, suggesting that individuals with EH may have a distorted impression of their own behavior. Healthy individuals evidenced significant pre- to post-session reductions in perceived stress, however individuals with EH evidenced no such reduction. Although it would be expected that perceived stress would increase for individuals with EH, it is possible that their perceptions of experienced stress are distorted in a similar manner as their perceptions of their level of disclosure.

Some limited empirical research has been conducted examining the relationship of self-disclosure and personality factors (e.g., hostility) that are considered to contribute to the development of cardiovascular diseases such as hypertension. Christensen and Smith (1993) assessed college undergraduate males with the Cook-Medley Hostility scale and recruited individuals scoring in the highest and lowest quartiles for participation in either a self-disclosure or a nondisclosure condition. Participants in the self-disclosure condition were asked to discuss a personally stressful issue with another person (a confederate) in a structured manner for five minutes. Participants in the nondisclosure condition were instructed to discuss the details of a hypothetical stressful event with another person (a confederate). Dependent measures included self-ratings immediately prior to the task of the intimacy and importance of the issues to be discussed, the magnitude of their personal reaction to the topic, how open and revealing they intended to be, and how much the issue

disrupted their life. Physiological measures of blood pressure and heart rate were collected at baseline and once per minute of the five-minute discussion task.

The high hostility group evidenced significantly greater mean systolic blood pressures at baseline relative to the low hostility group. Participants in the high hostility/self-disclosure group displayed significantly greater increases in blood pressure and heart rate than participants in any other group (No significant differences emerged on these measures for all other groups). Anticipated openness was found to be significantly related to cardiovascular reactivity in highly hostile participants.

CHAPTER III

THE PRESENT STUDY

There is some theoretical support suggesting that individuals diagnosed with essential hypertension who disclose their deepest feelings and thoughts regarding an upsetting event will experience physical health improvement in the months subsequent to the disclosure. Personality factors (e.g., hostility, defensive production of socially desirable responses, reluctance to disclose personal information), physiological factors (e.g., cardiovascular reactivity during interpersonal communication), and behavioral factors (e.g., suppression of overt emotional expression to avoid provoking interpersonal conflict) may all contribute to the maintenance of essential hypertension. These individuals tend to be highly physiologically reactive to interpersonal stressors, but they inhibit their intense emotional, cognitive, and behavioral reactions. This common profile would describe an individual who inhibits their expression of negative emotion to promote social acceptance, who may mistrust others, and who may become easily irritated during minor daily stress.

It has been suggested that the consistent salutary health effects demonstrated when healthy individuals disclose their feelings surrounding past upsetting events may be due to a release from inhibition of the previously suppressed negative feelings (Pennebaker & Beall, 1986). Alternate explanations suggest that language may play an organizational role whereby the negative experience becomes more amenable to assimilation by the individual

(Pennebaker & Francis, 1996). Although neither theoretical explanation is easily tested, an implication of existing disclosure research is that an individual who consistently relies upon an interpersonal style based on the *non-expression* of negative emotions and thoughts should benefit from the written disclosure of these emotions and thoughts.

Previous disclosure research suggests that few reliable self-reported health behavior changes emerge from written disclosure. However, the vast majority of disclosure studies have been performed using non-clinical healthy participants, and it is possible that this lack of consistent effect is a function of the relative healthy status of the research participants. Given the direct association between health behaviors (e.g., weight, smoking habits, alcohol intake) and severity of hypertension, changes in health behaviors may provide a more sensitive and meaningful index of health improvement in individuals with essential hypertension. Further, the relative success of behavioral interventions directed at lifestyle modification (Rosen, Brondolo, & Kostis, 1993) in reducing overall cardiac risk suggests that health behavior change may have a greater potential to influence physical health in a population of individuals with clinically diagnosed essential hypertension than in healthy individuals.

The present study was designed to investigate the influence of written emotional expression on clinically diagnosed essential hypertension. To determine whether written emotional disclosure has salutary health effects measures of physical and psychological health and well being were examined prior to and following participation in a modified written disclosure task. The hypotheses of the present study were as follows:

Hypothesis One

Based on previous findings from written emotional expression studies (e.g., Smyth, 1998) that indicate consistent increases in pre to postwriting distress and physiological activation, it was hypothesized that individuals who wrote about their deepest emotions and thoughts regarding a current upsetting or negative event in their lives would evidence an increase in self-reported negative mood and physiological activity from pre to post-writing across the four writing days.

Hypothesis Two

Part One. – It was hypothesized that individuals who wrote about their deepest emotions and thoughts regarding a current upsetting or negative event in their lives would evidence physical health improvement at the three-month follow-up in the following areas: a) blood pressure and heart rate, b) self-reported physical symptoms, and c) self-reported health behaviors.

Part Two. – It was hypothesized that individuals who write about their deepest emotions and thoughts regarding a current upsetting or negative event in their lives would evidence psychological improvement at the three month follow-up in the following areas: a) self-reported mood, b) self-reported psychological symptoms, c) self-reported daily stress, and d) hostility.

These hypotheses are congruent with previous findings that written disclosure of traumatic or negative events leads to improvements in health and well being (Pennebaker & Beall, 1986; Pennebaker et al., 1988).

CONCLUSION

CHAPTER IV

METHOD

Participants

Thirty-nine individuals who were diagnosed with essential hypertension by their physician and who took medication to control their blood pressure participated in the study. Participants were recruited both through direct collaboration with a local physician and solicitation in a variety of contexts (e.g., at local hospital sponsored health education programs, solicitation through mass mailing to Oklahoma State University staff). Participants were screened to insure that they: 1) attended regular physician visits for their hypertension, 2) were stabilized on their medication regimen for at least three months prior to participation, and 3) were able to write. Individuals who reported major health problems requiring regular medical treatment in addition to hypertension (e.g., diabetes) were excluded from the study to increase the probability of attaining a homogenous sample of individuals with hypertension.

Instruments

Demographics Questionnaire (DQ)

Participants completed the DQ which includes information about age, ethnicity, marital and employment status, and current health (Appendix A). This measure was included for descriptive purposes and participants completed it during the second session.

Daily Stress Inventory (DSI)

The DSI is a 58 item self-report measure (Brantley, Waggoner, Jones, & Rappaport, 1987) that asks individuals to indicate stressful events that they have experienced within the last 24 hours. Once an event is endorsed, individuals rate the stressfulness of those events on a 7-point Likert scale ranging from 1 (“occurred, but was not stressful”) to 7 (“caused me to panic”). The DSI has been shown to have concurrent validity with other self-report measures and biochemical measures of daily stress (Brantley, Waggoner, Jones, & Rappaport, 1987). Participants completed this measure prior to the first session and at the three-month follow up session.

Wahler Physical Symptoms Inventory (WPSI)

The WPSI (Wahler, 1968) allows respondents to indicate how often they are bothered by 42 physical troubles. Individuals rate each physical symptom on a 6-point Likert scale of symptom frequency ranging from 0 (“almost never”) to 5 (“nearly every day”). Test-retest reliability coefficients range from .69 to .94 over periods of one day to one week, and from .45 to .84 over periods of one to 13 weeks (Wahler, 1968).

Participants completed this measure prior to the first session and at the three-month follow up session.

Brief Symptom Inventory (BSI)

The BSI (Derogatis 1975) is a 53-item self-report measure designed to assess psychological symptoms that individuals are experiencing. Respondents rate the degree that they are distressed by each psychological symptom on a 5-point Likert scale ranging from 0 ("not at all") to 4 ("extremely"). The BSI has been found to have sufficient internal consistency with alpha coefficients ranging across its dimensions from .71 to .85 (Derogatis & Melisaratos, 1983). Participants completed this measure prior to the first session and at the three-month follow up session.

Positive and Negative Affect Schedule (PANAS)

The PANAS (Watson, Clark, & Tellegen, 1988) consists of 20 mood descriptors (e.g., excited, active, or hostile). Respondents rate on a 5-point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely) the extent to which they experienced each mood at a specified point in time (e.g., at this present moment, during the past week). Ten of the items assess negative affect and 10 items assess positive affect. Summed scores for each set of 10 items yields positive affect (PA) and negative affect (NA) subscores. The PANAS has been found to have sufficient internal consistency based on the time instructions (Watson, Clark, & Tellegen, 1988) with alpha coefficients ranging from .86 to .90 for the PA subscale, and from .84 to .87 for the NA subscale. The PANAS shows significant test-retest stability for both subscales, which tends to increase as the rated time

length increases. Two forms of the PANAS were used in the current study. Participants completed an immediate version assessing their mood “at this present moment” prior to and following the essay writing on each of the first four sessions. Participants also completed a version of the PANAS assessing their mood “during the past month” at the three-month follow up session.

Cook-Medley Hostility Scale (CMHS)

This hostility scale was constructed based on identification of MMPI items that distinguished teachers with good student rapport from teachers with poor student rapport (Cook & Medley, 1954). Based on those individuals that scored high on the scale, Cook and Medley describe the hostile person as one that has little confidence in others and sees others as dishonest, ugly, mean and unsocial. This measure consists of 50 statements that are judged by the participant to either be true or false as applied to them. Several studies have demonstrated the validity and reliability of this measure (Greenglass & Julkunen, 1989; Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989; Steinberg & Jorgenson, 1996). Participants completed this measure prior to the first session and at the three-month follow up session.

Health Behavior Questionnaire (HBQ)

The HBQ was designed for the present study to assess potential changes in health behaviors such as diet, exercise, or smoking (Appendix B). Items for this scale were adapted from the multiple risk factor portion of the Lifestyle Appraisal Questionnaire (LAQ), an instrument developed to assess multiple health risks and stress (Craig,

Hancock, & Craig, 1996). These risk factor items were modified for the present study to create an instrument sensitive to changes in health behaviors. Respondents answer 13 health behavior items along scales of frequency (e.g., how often do you exercise or go for a walk?). Participants completed this measure prior to the second session and at the three-month follow up session.

Essay Evaluation Measure (EEM)

The six item EEM (Pennebaker & Beall, 1986) asks participants to rate their writings (considering all four days of writing) on a seven-point Likert scale (ranging from 1 = *not at all*, to 7 = *a great deal* or *extremely*) how personal and emotionally revealing they considered their essay to be, and the degree to which they had previously told others about the events or topics contained in their essays (Appendix C). This measure has been directly adapted from Pennebaker's protocol (personal communication, March 28, 1998). Participants completed this measure following their writing on the fourth session.

Essay Influence Measure (EIM)

The EIM (Pennebaker & Beall, 1986; Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Pennebaker & Francis, 1996) asks participants to rate seven items using a seven-point Likert scale (ranging from 1 = *not at all*, to 7 = *a great deal*) the degree to which the essay writing affected their thoughts and moods, and their overall perceived benefit from the study. An additional question asks participants to report how participation might have influenced them. This measure (Appendix D) has been directly adapted from Pennebaker's

protocol (personal communication, March 28, 1998). Participants completed this measure at the three-month follow up session.

Apparatus

Physiological Measures

Heart rate and blood pressure served as indices of autonomic arousal for each condition. Heart rate data was collected via a Polar Vantage Night Vision Heart Rate Monitor. This device consists of a grooved electrode that is secured against the participant's chest with an elastic strap. The electrode transmits heart rate information to a wrist receiver, similar to a watch, which was worn by the participant. The participant was instructed on how to start and stop the receiver. Heart rate data was collected continuously throughout the resting baseline and writing periods. This data was then downloaded to a personal computer using the Polar Advantage Interface System. Blood pressure data was collected using a Sunmark brand Digital Blood Pressure monitor. Blood pressure data was collected following the resting baseline and writing periods.

Procedure

Potential participants were given a solicitation letter informing them about the research study, and individuals expressing interest in participating were screened by telephone to generally inform them about the study, to insure that inclusion criteria were met, and to schedule times when they could come into the laboratory for participation

should they be willing and eligible to participate. Participants were randomly assigned to either the control condition or the experimental condition.

Session One

Upon arriving at the laboratory on the first day, participants were asked to read and sign informed consent, and they were given a second copy of the consent form to keep. Participants were then instructed on how to wear and operate the Polar continuous heart rate monitor. After putting on the heart rate monitor in private, participants were asked to sit in a reclining easy chair in the experimental room.

The experimenter explained the general experimental procedure and that they would be monitored from the adjacent room should they have any questions during the session. Participants were informed that a research assistant would measure their blood pressure twice during each session. They were informed that they would be receiving audiotaped instructions on 1) when to start and stop the heart monitor, 2) when to complete several questionnaires, and 3) when and how to perform the 20-minute writing task. Participants put on a set of headphones connected to a tape recorder and the experimenter directed them to start the audiotaped instructions after the experimenter left the room, and to let the tape run until they were instructed to turn off the tape recorder.

Participants were instructed to complete the session-1 measures (i.e., the Cook-Medley Ho scale, DSI, WPSI, and the BSI), then to recline in the chair, start the heart rate monitor and tape recorder, and relax for a five-minute baseline period. After five minutes the audiotape cued them to stop the heart rate monitor, and a research assistant entered to

measure and record their resting blood pressure. Participants were then instructed to complete the PANAS (immediate version).

Audiotaped instructions were then given to participants in both conditions to convey the following broad overview of the study. All writing instructions have been directly adapted from Pennebaker (personal communication, January 29, 1998).

This is an extremely important study looking at writing. Over these first four days of the study, you will be asked to write about one of several different topics for 20 minutes during each session. The only rule that we have about your writing is that you write continuously for the entire 20 minutes. If you run out of things to say, just repeat what you have already written. In your writing, don't worry about grammar, spelling, or sentence structure - just write. Different people will be asked to write about different topics. Because of this, I ask that you not talk with anyone about the experiment. Because we are trying to make this a very controlled study, I can't tell you what other people are writing about or anything about the nature or predictions of the study. When you come back for the three-month follow up session, however, you will be told everything.

Another thing is that sometimes people feel a little sad or depressed after writing. If that happens, it is completely normal. Most people say that these feelings go away in an hour or so. If at any time over the course of the experiment you feel upset or distressed, please contact one of the experimenters immediately. It is important that you know that your writing is completely confidential. The content of your writing will not be shared with your physician.

Participants in the experimental condition then received the following condition-specific audiotaped instructions:

What I would like for you to write about over the four days of the study is a negative or upsetting issue or event in your life that you find troubling. This could be any type of issue or event that has been bothersome to you, but it should be one that you are currently experiencing or have recently experienced. In your writing, I want you to really let go and explore your very deepest emotions and thoughts. You can write about the same

experience on all four days or about different experiences each day. Whatever you choose to write, however, it is critical that you delve into your deepest emotions and thoughts related to the issue. Ideally, we would like you to write about significant current or recent negative or upsetting experiences that you have not discussed a great deal with others. Remember that you have four days to write. You might tie this personal experience to other parts of your life. For example, how is the issue or event related to your childhood, your parents, the people you love, who you are, or who you want to be? Again, try to examine your deepest emotions and thoughts when you write about the negative or upsetting issue or event.

Participants in the control condition then received the following condition-specific audiotaped instructions:

What I would like for you to write about over the next four days is how you use your time. Each day, you will get different writing assignments on the way that you spend your time. In your writing, I want you to be as objective as possible. I am not interested in your emotions or opinions related to how you spend your time. Feel free to be as detailed as possible, but I want you to try to be as objective as you can be. In today's writing, I want you to describe what you did yesterday from the time that you got up in the morning until the time that you went to bed. For example, you might start when your alarm went off and you got out of bed. You could include the things that you ate, where you went, or which buildings or objects you passed by as you walked from place to place. The most important thing in your writing, however, is for you to describe your days as accurately and as objectively as possible.

Participants then started the heart rate monitor and began writing. After 20 minutes they were instructed to stop the heart rate monitor, and they had their blood pressure and heart rate measured. Participants then completed the PANAS (immediate version). At the conclusion of the session, the experimenter gave participants a sheet including laboratory telephone numbers, so that they could contact the experimenter in the event that they become upset or distressed following participation.

Sessions Two Through Four

During the three subsequent writing sessions participants first put on the heart monitor in private. They then were brought into the experimental room to sit in the reclining easy chair and were asked to put the on the headphones. Audiotaped instructions cued them to start the heart monitor, and to relax for the five-minute resting baseline. Participants were cued to stop the heart rate monitor after five minutes, and they had their blood pressure and heart rate measured. Participants then completed the PANAS (immediate version).

Participants in the experimental condition then received the following condition-specific audiotaped instructions (dependent on the session):

Session Two. Today, I want you to continue writing about a negative or upsetting issue or event that is troubling you. It could be the same topic that you wrote about in session one, or it could be something different. Today I really want you to explore your very deepest emotions and thoughts.

Session Three. You have written now for two days. You only have today and tomorrow to finish your writing. As with the first two days, I want you to really explore your deepest emotions and thoughts about the troubling issue or event.

Session Four. Today is your last day to write in the laboratory. In your writing today, I again want you to explore your deepest thoughts and feelings about your current or recent negative, upsetting event. Remember that this is the last day and so you might want to wrap everything up. For example, how is this experience related to your current life and your future? But feel free to go in any direction you feel most comfortable with and delve into your deepest emotions and thoughts.

Participants in the control condition then received the following condition-specific audiotaped instructions (dependent on the session):

Session Two. Today, I would like you to describe what you have done today since you woke up. Again, I want you to be as objective as possible in describing exactly what you have done up until coming into this session.

Session Three. Today I would like you to describe in detail what you will do as soon as the experiment is over until you go to bed tonight. For example, you might start by noting that you will walk out of the door, go down the stairs, walk to your car, and so forth. Remember, I want you to be as objective as possible in your description.

Session Four. Today is your last day to write in the laboratory. In your writing today, I would like you to describe what you will be doing over the next week. Remember, I want you to be as objective as possible in your description.

Participants then started the heart rate monitor and began writing. After 20 minutes they stopped the heart rate monitor, and had their blood pressure and heart rate measured. Participants then completed the PANAS (immediate version). A preliminary debriefing was conducted following this session and the experimenter addressed questions or concerns that participants had related to the study without revealing the exact nature of the study.

Session Five

Approximately three months following the fourth session, each participant was contacted by telephone and scheduled to come into the laboratory for a follow up assessment. Upon arriving at the laboratory participants put on the heart monitor in private. They were then asked to sit in the reclining easy chair in the experimental room, start the heart monitor, and relax for five minutes. After the five-minute resting baseline, participants were instructed to stop the heart monitor, and they had their blood pressure and heart rate measured. At this time, participants were instructed to complete the

PANAS (prior month version), the Cook-Medley Hostility Scale, the Daily Stress Inventory, the Wahler Physical Symptoms Inventory, the Brief Symptoms Inventory, the Health Behavior Questionnaire, and the Essay Influence Measure. The experimenter then fully debriefed participants about the purpose of the study. Participants were informed of which condition they participated in, as well as what the alternate condition was.

Following debriefing, participants in the control group were offered participation in the experimental task to insure that every participant has an equal opportunity for possible improvements in health and psychological well being.

CHAPTER V

RESULTS

Randomization and Manipulation Checks

To insure that individuals wrote in a manner consistent with their assigned writing instructions, two independent judges rated the content of each participant's writings on a dichotomous yes/no scale (yes = writing was consistent with assigned instructions for all four days; no = writing was not consistent with assigned instructions for all four days). Data from participants who were judged as not engaging in their writing task by either rater were excluded from all subsequent statistical analyses. This resulted in the exclusion of four participants' data. Two of the original 39 participants did not complete all five sessions and their partial data were also excluded from analysis. In total, data from six participants (three experimental and three control participants) were excluded from subsequent statistical analyses. This exclusion process left data from 33 participants (24 women and 9 men) for the primary statistical analysis.

To determine if individuals whose data were excluded from the primary statistical analyses (i.e., "non-completers") differed from individuals who completed the study as directed [i.e., "completers" (both control and experimental groups combined)], post hoc independent samples t-tests were performed to compare the groups at baseline on physical, psychological, and demographic variables. These comparisons were strictly

exploratory and results should be considered with caution due to the low number of non-completers ($N = 6$). Except for health behaviors and diastolic blood pressure, no differences emerged between completers and non-completers across these variables. Non-completers reported engaging in more and/or more frequent health behaviors at baseline ($M = 38.33$, $SD = 3.08$) than completers ($M = 28.36$, $SD = 5.54$), $t(37) = -4.26$, $p < .001$. Non-completers also had higher diastolic blood pressure at baseline ($M = 88.17$, $SD = 7.19$) than completers ($M = 77.88$, $SD = 12.10$), $t(37) = -2.85$, $p < .05$.

Due to scheduling conflicts, some participants were unable to attend a follow-up session exactly twelve weeks following their fourth writing session. Thus, a post hoc independent samples t-test was performed to determine if differences in the number of days between the final writing session and the follow-up session existed between writing conditions. This analysis revealed no significant group differences between participants in the experimental condition ($M = 89.41$, $SD = 7.89$) and those in the control condition ($M = 95.00$, $SD = 12.84$), $t(31) = 1.52$, *ns*.

As an additional measure of writing task fulfillment, independent samples t-tests were used to compare the groups on three self-report questions from the Essay Evaluation Measure which was completed following the fourth writing session. Participants in the experimental condition rated their writing topics as more personal ($M = 6.38$, $SD = .86$) than participants in the control condition ($M = 4.19$, $SD = 2.14$), $t(31) = -3.92$, $p < .001$. Participants in the experimental condition also reported having previously talked with others about their writing topics more ($M = 3.79$, $SD = 1.55$) than participants in the control condition ($M = 1.63$, $SD = 1.09$), $t(31) = -4.62$, $p < .001$. Lastly, participants in the experimental condition reported that their writing was more emotionally laden

($M = 5.32$, $SD = 1.51$) than participants in the control condition ($M = 2.75$, $SD = 1.73$), $t(31) = -4.56$, $p < .001$.

To test the effectiveness of the randomization procedure, pre-treatment group differences were examined by conducting a series of chi-square analyses and independent samples t-tests, using demographic variables and baseline measures of physical and psychological health. First, chi-square analyses performed on gender and ethnicity resulted in no significant differences in the distribution of gender across experimental condition, $X^2(4, N = 33) = .08$, *ns*, or in the distribution of ethnic minorities across experimental condition, $X^2(4, N = 33) = .97$, *ns*. It should be noted that after exclusion of data, 32 participants were Caucasian, and one was African American. An independent samples t-test on age indicated that participants in the experimental condition were significantly younger ($M = 54.35$, $SD = 12.24$) than participants in the control condition ($M = 64.13$, $SD = 9.83$), $t(31) = 2.52$, $p < .05$. These results are summarized in Table 1 (Appendix E).

Independent samples t-tests were then performed to compare the groups on baseline measures of physical health (i.e., blood pressure, heart rate, number of physical symptoms, and health behaviors) and measures of psychological well-being (i.e., positive and negative affect, psychological symptoms, daily stress, and hostility) to insure that adequate random assignment to experimental group was achieved.

There was no difference in baseline systolic blood pressure of participants in the experimental condition ($M = 140.41$, $SD = 21.67$), compared to those in the control condition ($M = 142.06$, $SD = 21.39$), $t(31) = .22$, *ns*. Likewise, there was no difference in baseline diastolic blood pressure of participants in the experimental condition ($M =$

80.76, $SD = 13.41$), compared to those in the control condition ($M = 74.81$, $SD = 10.04$), $t(31) = -1.44$, *ns*. There was no difference in baseline resting heart rate of participants in the experimental condition ($M = 72.67$, $SD = 8.17$), compared to those in the control condition ($M = 74.20$, $SD = 10.46$), $t(27) = .44$, *ns*. Participants in the experimental condition reported significantly more physical symptoms at baseline ($M = 22.24$, $SD = 8.07$) than those in the control condition ($M = 15.56$, $SD = 6.88$), $t(31) = -2.55$, $p < .05$. Also, participants in the experimental condition reported engaging in fewer and/or less frequent health behaviors at baseline ($M = 26.35$, $SD = 4.64$) than those in the control condition ($M = 30.50$, $SD = 5.75$), $t(31) = 2.29$, $p < .05$.

There was no difference at baseline in reported positive affect between participants in the experimental condition ($M = 25.59$, $SD = 6.76$) compared to those in the control condition ($M = 29.63$, $SD = 9.80$), $t(31) = 1.38$, *ns*. However, participants in the experimental condition reported greater negative affect ($M = 12.35$, $SD = 2.29$) at baseline than those in the control condition ($M = 10.69$, $SD = 1.20$), $t(31) = -2.59$, $p < .05$. Participants in the experimental condition also reported greater severity of psychological symptoms (BSI global severity index) at baseline ($M = .79$, $SD = .45$) than those in the control condition ($M = .45$, $SD = .36$), $t(31) = -2.40$, $p < .05$. There was no difference at baseline in reported daily stress between participants in the experimental condition ($M = 54.47$, $SD = 34.40$) compared to those in the control condition ($M = 40.94$, $SD = 52.44$), $t(31) = -.88$, *ns*. There was also no difference at baseline in hostility level between participants in the experimental condition ($M = 16.41$, $SD = 4.60$) compared to those in the control condition ($M = 15.81$, $SD = 5.31$), $t(31) = -.35$, *ns*. These results are summarized in Table 2 (see Appendix E).

Hypothesis Testing

Pre-Post Session Analyses

Pre- to post-session difference scores were calculated for negative mood and the physiological measures of systolic and diastolic blood pressure for each of the four writing sessions. Pre-writing to during-writing difference scores were also calculated for heart rate for each session. These difference scores were then averaged across the four writing sessions for each of these measures. Group differences in negative mood and physiological response to writing were evaluated using separate analyses of covariance (ANCOVA) for each of these dependent variables. These tested the effect of condition (experimental vs. control), while statistically controlling for age. All reported means for these ANCOVAs have been adjusted for age.

It was hypothesized that, relative to controls, experimental participants would experience an increase in self-reported negative affect and physiological activation from pre- to post-writing across the four writing sessions. Experimental participants evidenced significantly greater increases in negative affect from pre-writing to post-writing ($M = 2.29$) than control participants ($M = -.10$), $F(1,33) = 5.04$, $p < .05$. Several single item questions completed at the three-month follow-up (Essay Influence Measure) assessed perceived impact of writing (1 = "not at all," 7 = "a great deal"), and were analyzed using independent samples t-tests. The only group difference that emerged was that control participants reported feeling more happy since their participation in the study ($M = 5.38$, $SD = 1.93$) than experimental participants ($M = 3.91$, $SD = 1.09$), $t(31) = 2.70$, $p < .05$.

There were no pre-writing to during-writing group differences across any of the measures of physiological functioning. Specifically, there was no difference in systolic blood pressure (pre- to post-writing change) of experimental participants ($M = 4.82$) compared to control participants ($M = 4.03$), $F(1,33) = .13$, *ns*. Likewise, there was no difference in diastolic blood pressure (pre- to post-writing change) of experimental participants ($M = 2.55$) compared to control participants ($M = 3.83$), $F(1,33) = .42$, *ns*. Lastly, there was no difference in heart rate (pre-writing to during-writing change) of experimental participants ($M = 78.56$) compared to control participants ($M = 77.50$), $F(1,25) = .24$, *ns*.

Three-Month Follow-up Analyses

Group differences in physical health and psychological well-being were then evaluated using separate analyses of covariance (ANCOVA). Analyses tested the effect of condition (experimental vs. control) at 12 weeks following writing, while controlling for baseline scores and age. All reported means from these ANCOVAs have been adjusted for baseline levels and age.

Physical Health – It was hypothesized that, relative to controls, experimental participants would experience physical health improvement in the following areas at three-month follow-up: systolic and diastolic blood pressure, heart rate, physical symptoms, and health behaviors. At follow-up there was no difference in systolic blood pressure between experimental participants ($M = 141.34$) and control participants ($M = 145.46$), $F(1, 33) = .46$, *ns*. There was also no difference in diastolic blood pressure

between experimental participants ($M = 81.84$) and control participants ($M = 84.38$), $F(1, 33) = .52$, ns. There was no difference in resting heart rate between experimental participants ($M = 70.60$) and control participants ($M = 69.51$), $F(1, 23) = .09$, ns. There was no difference in number of reported physical symptoms between experimental participants ($M = 17.54$) and control participants ($M = 17.43$), $F(1, 32) = .00$, ns.

However, experimental participants reported engaging in more and/or greater frequency of health behaviors ($M = 31.02$) than control participants ($M = 27.16$), $F(1, 33) = 8.11$, $p < .01$ at three-month follow-up, controlling for age and baseline health behaviors. As an additional analysis to determine if this difference was due to changes in health behaviors over time for each group, a repeated measures ANOVA was performed separately for each experimental group. Experimental participants demonstrated a significant increase in number and/or frequency of health behaviors from baseline ($M = 26.35$, $SD = 4.64$) to follow-up ($M = 29.18$, $SD = 5.26$), $F(1, 16) = 11.15$, $p < .005$. Control participants demonstrated no significant change in health behaviors from baseline ($M = 30.50$, $SD = 5.75$) to follow-up ($M = 29.00$, $SD = 5.73$), $F(1, 15) = 3.03$, ns. Figure 1 (Appendix E) depicts these mean values.

Psychological Well Being – Lastly, it was hypothesized that, relative to controls, experimental participants would experience psychological improvement in the following areas at three-month follow-up: mood, general psychological symptoms, daily stress, and hostility. At follow-up there was no difference in positive affect between experimental participants ($M = 32.38$) and control participants ($M = 32.64$), $F(1, 33) = .02$, ns. There was also no difference in negative affect between experimental participants ($M = 18.39$)

and control participants ($M = 16.69$), $F(1, 33) = .65$, *ns*. There was no difference in severity of psychological symptoms between experimental participants ($M = .57$) and control participants ($M = .55$), $F(1, 32) = .02$, *ns*.

However, experimental participants reported greater daily stress ($M = 44.91$) than control participants ($M = 28.88$), $F(1, 33) = 5.31$, $p < .05$, at three-month follow-up, controlling for age and baseline scores. As an additional analysis to determine if this difference was due to changes in daily stress over time for each group, a repeated measures ANOVA was performed separately for each experimental group. There was no significant change in daily stress for experimental participants from baseline ($M = 54.47$, $SD = 34.40$) to follow-up ($M = 49.41$, $SD = 28.10$), $F(1, 16) = 1.03$, *ns*. Further, there was no significant change in daily stress for control participants from baseline ($M = 40.94$, $SD = 52.44$) to follow-up ($M = 24.38$, $SD = 20.00$), $F(1, 15) = 2.42$, *ns*. Figure 2 (Appendix E) depicts these mean values, and suggests that the group difference at follow-up was due to slightly lower daily stress in the control group at baseline and a sufficient (but not significant) decrease in control group scores over time.

Despite significantly greater reported stress, experimental participants evidenced less hostility ($M = 15.02$) than control participants ($M = 18.30$), $F(1, 33) = 4.37$, $p < .05$ at three-month follow-up, controlling for age and baseline scores. As an additional analysis to determine if this difference was due to a changes in hostility over time for each group, a repeated measures ANOVA was performed separately for each experimental group. There was no significant change in hostility for experimental participants from baseline ($M = 16.41$, $SD = 4.60$) to follow-up ($M = 16.32$, $SD = 5.81$), $F(1, 16) = .01$, *ns*. Further, there was no significant change in hostility for control participants from baseline ($M =$

15.81, $SD = 5.31$) to follow-up ($M = 17.00$, $SD = 7.73$), $F(1, 15) = 1.24$, *ns*. Figure 3 (Appendix E) illustrates that hostility increased in the control group over time, relative to experimental participants, but not sufficiently to produce a main effect for time. Results from the ANCOVAS of these physical and psychological measures and observed effect sizes are summarized in Table 3 (see Appendix E). Between group differences at three-month follow-up (controlling for baseline levels and age) for health behaviors, daily stress, and hostility are shown in Figure 4 (see Appendix E).

CHAPTER VI

DISCUSSION

The purpose of the present study was to examine the influence of written emotional expression on the physical health and psychological well being of individuals who were clinically diagnosed with essential hypertension. Specifically, this study attempted to investigate both the immediate effects of written emotional expression on mood and physiological response, and the longer term effects of written emotional expression on physical health and psychological well being. Two primary hypotheses regarding the effects of written emotional expression were examined. First, it was hypothesized that individuals who wrote about their deepest emotions and thoughts regarding a current upsetting or negative event in their lives would evidence increased self-reported negative mood and physiological activity from pre to post-writing across the four writing days. Also, it was hypothesized that these same individuals would evidence improvements in physical health and psychological well being three months following the study.

Summary of Findings

Preliminary analyses examining randomization of group assignments across physical and psychological measures at baseline revealed some initial group differences.

First, participants in the experimental condition were about ten years younger than participants in the control condition. Next, baseline differences in physical and psychological variables suggested that experimental participants were generally less physically well and under greater psychological distress than control participants prior to participating in the study. Specifically, experimental participants reported having more physical symptoms and engaging in fewer health behaviors at baseline than control participants. Experimental participants also reported greater negative affect and greater severity of psychological symptoms at baseline than control participants. Based on these preliminary analyses, baseline levels of these variables were statistically controlled in the primary analyses.

Manipulation checks for the effectiveness of the experimental task revealed that, as predicted, individuals who wrote their thoughts and feelings about current upsetting events rated their writing topics as more personal and emotionally laden than individuals who wrote about time management. They also reported having spoken with others about their writing topics more than those in the time management (i.e., control) condition. Consistent with previous research on written emotional disclosure (e.g., Pennebaker & Beall, 1986; Greenberg & Stone, 1992), these results suggest that participants engaged in their assigned writing tasks as instructed.

Hypothesis One

Analysis of hypothesis one revealed that post-writing negative mood (i.e., post-session average) was greater for individuals in the experimental group than for those in the control group. However, no group differences in physiological activation (i.e., heart rate,

systolic or diastolic blood pressure) across the four sessions emerged. This post-writing increase in negative mood is consistent with previous studies which have reliably demonstrated that writing about stressful or traumatic experiences elicits short-term distress (e.g., Pennebaker & Beall, 1986; Pennebaker et al., 1988; Greenberg et al., 1996). Indeed, a meta-analysis of experimental written disclosure studies demonstrated that the mean effect size for short-term distress following disclosure was greater than the effect size for all of the various health outcomes examined in published studies (Smyth, 1998). Although the lack of differences in physiological response to writing across the four sessions has been previously demonstrated (e.g., Forston, 1991), it stands in contrast to other studies (e.g., Pennebaker & Beall, 1986; Pennebaker et al., 1987). Physiological response to emotional disclosure has been assessed in several different ways (e.g., heart rate, blood pressure, skin conductance) in a number of studies and the findings are generally equivocal.

Hypothesis Two

Hypothesis two was addressed through two separate sets of analyses. The first set of analyses examining physical health parameters revealed no group differences at three-month follow-up across measures of blood pressure, resting heart rate, or number of physical symptoms. However, group differences did emerge for health behaviors at three-month follow-up. Specifically, individuals in the experimental group reported engaging in greater numbers of health behaviors at three-month follow-up than controls. Follow-up analyses revealed that experimental participants demonstrated a significant increase in health behaviors over the three-month study period. Control participants demonstrated a

slight, but statistically non-significant, decrease in health behaviors over the same time period.

Previous emotional disclosure studies examining physiological functioning have not assessed blood pressure and heart rate as specific long-term health outcomes. Thus, a contextual interpretation of this result is difficult. The lack of group differences in physical symptoms at follow-up is consistent with previous studies of healthy populations (Pennebaker & Beall, 1986, Greenberg & Stone, 1992). One study, however, found that individuals who disclosed traumas experienced decreased upper respiratory symptoms following disclosure compared to controls (Greenberg et al., 1996). The group differences in health behaviors contrast previous written disclosure studies of healthy populations. These studies have suggested that health behaviors are not affected by written emotional disclosure (Pennebaker & Beall, 1986; Pennebaker et al., 1990; Spera et al., 1994).

The second set of analyses examining hypothesis two revealed no group differences at three-month follow-up in the primary psychological measures of mood and general psychological symptoms. However, group differences did emerge at three-month follow-up in daily stress. Specifically, individuals in the experimental group evidenced greater daily stress at three-month follow-up than controls. Follow-up analyses revealed no significant change in daily stress for either experimental or control participants over the duration of the study. Control participants also reported being more happy than experimental participants since their participation in the study on a single item from the Essay Influence Measure. Group differences also emerged at three-month follow-up in hostility. Specifically, individuals in the experimental group evidenced less hostility at

three-month follow-up than controls. Follow-up analyses revealed no significant change in hostility for either experimental or control participants over the duration of the study.

The lack of group differences in mood and psychological symptoms at follow-up is not consistent with the findings in the general emotional disclosure literature (Smyth, 1998), namely, that significant long-term improvements in psychological well-being result from written emotional disclosure. It should be noted, however, that methods of assessing long-term psychological well being have varied significantly between studies (e.g., positive and negative affect, anxiety, adjustment to college, general temperament). Further, some studies have demonstrated incongruous results regarding long-term mood or psychological change (e.g., Pennebaker et al., 1990; Greenberg & Stone, 1992). Although previous studies have not specifically utilized measures of daily stress or hostility as indices of psychological well being, they were included in the present study because of the potential disease-specific impact of these psychosocial factors on essential hypertension. The group difference in hostility at follow-up (i.e., experimental participants evidenced less hostility than controls) was consistent with the hypotheses of the present study. However, the group difference in daily stress at follow-up (i.e., experimental participants reported greater daily stress than controls) was contrary to the predicted effect. This apparent inconsistency will be discussed in the general discussion that follows.

General Discussion of Findings

Given the conservative exclusion criteria regarding writing content and the significant differences in self-evaluations of writing topics (e.g., more personal, emotionally laden), it appears that participants engaged in the assigned writing tasks.

Moreover, the observed increase in immediate negative affect reported by experimental participants from pre- to post-writing provides further evidence that experimental participants wrote in the manner in which they were instructed. In other words, negative mood states resulting from writing one's feelings and thoughts surrounding upsetting events are to be expected because such writing forces individuals to focus their attention on the distressing topic for a discrete period of time. Indeed, this phenomenon has been cited as an index of emotional disclosure in previous studies (e.g., Pennebaker & Beall, 1986; Greenberg et al., 1996).

However, the absence of physiological response to the emotional disclosure task was unexpected; several possible explanations may account for this inconsistency. First, not all disclosure studies have utilized physiological activation as a short-term response index, and it has been primarily used to indicate behavioral disinhibition in trauma disclosers. To illustrate, Pennebaker, et al. (1987) found that individuals who disclosed traumatic events to a tape recorder experienced greater cardiovascular activation (i.e., increased heart rate and blood pressure) and lower skin conductance levels (SCL's) during disclosure than individuals who related trivial topics. Similarly, Petrie and colleagues (1995) found that for individuals who emotionally disclosed, SCL steadily declined over a four-day course of written disclosure compared to controls. Pennebaker and Beall (1986) found that individuals disclosing both factual and emotional accounts of a traumatic experience demonstrated an initially large increase in cardiovascular activation during the first writing session, followed by pre- to post-writing decreases in subsequent sessions. Although not a direct physiological measure, Petrie and colleagues (1995) found that individuals who wrote about traumatic experiences reported higher scores on self-report

ratings of physical symptoms (e.g., "pounding heart") immediately following writing first compared to controls. heart rate readings only from this period (Essenberg et al., 1984) if

In short, the basis for predicting physiological response to emotional disclosure in the present study may have been somewhat unrealistic given that most previous studies in which this response has been observed have involved individuals who have experienced trauma and for whom emotional disclosure of trauma represents a tremendously cathartic event. It may be that asking individuals with hypertension to write about ongoing or recent upsetting events simply is not as comparably distressing as asking healthy individuals to disclose specific traumatic events. Individuals with essential hypertension may be so different than previously studied healthy populations that meaningful comparisons of effects become impossible. However, because some group differences did emerge at follow-up, it is unlikely that the writing task was completely ineffective in influencing positive changes in physical health and psychological well being.

Additionally, the manner of heart rate measurement used in the present study may have accounted for the lack of differences between groups. The pre-writing baseline heart rate measurement consisted of an average of heart rates (taken every five seconds) across five minutes of resting. However, the during-writing measurement consisted of an average of heart rates taken throughout the twenty minutes of the writing task. It is possible that because of the duration of writing, participants in the experimental condition had an initial activation response which was then diluted through the subsequent averaging of heart rate measurements over time. This type of response would be congruent with the findings of Pennebaker and Beall (1986) described above. One alternative that might have enhanced the sensitivity of this measure of physiological reactivity would have been to identify a

more discrete “critical period” during the initial portion of the writing task (e.g., the first five minutes) and use heart rate readings only from this period (Eisenberg et al., 1994). It may be that a more refined index of reactivity such as vagal tone (Eisenberg et al., 1995) may be necessary to detect group differences in physiological response with this type of experimental task.

The positive impact on health behaviors that experimental participants demonstrated at follow-up was the only apparent change in physical health. However, this finding has broad implications for this particular chronic illness. Improved health behaviors have a direct influence on the physical risk factors associated with hypertension, and whereas these changes may not ultimately control blood pressure in and of themselves, they likely contribute to an improved quality of life. It is possible that individuals who wrote about the upsetting issues in their lives freed resources that they could subsequently apply to concrete positive health change. Alternately, study participation may have served as a catalyst for these individuals to initiate further lifestyle changes.

Although experimental participants did not evidence improvements in blood pressure over the course of the study, it is possible that a longer term follow-up would increase the likelihood of seeing improvement in this area, because it could realistically take longer than three months for physical health improvements to become apparent following health behavior change. Alternately, because all participants in the study were currently on medication to control their blood pressure, the lack of significant treatment impact may have been due to little variability in blood pressure. Thus, there may have been little opportunity for *any* adjunctive treatment to have a further impact.

The differences at follow-up between the experimental and control groups on the variables of daily stress and hostility may hold the greatest theoretical implications for this population, given the limited efficacy for behavioral treatments of hypertension addressing the psychosocial correlates of the disease (Wadden et al., 1984). The difference in daily stress at follow-up appears to be due to the non-significant decrease in daily stress over time in control participants. It is possible that the control condition, although designed to have no impact on physical or psychological health, resulted in somewhat diminished *perceptions* of stress (i.e., perhaps participating in regular sessions of a study broadly directed at hypertension may have a placebo effect on perceptions of daily stress). Similarly, the difference in hostility at follow-up appears to be due to both a slight non-significant decrease in hostility over time in experimental participants coupled with a slight non-significant increase in hostility over time in control participants. Again, one explanation for this result is that the control condition exerted some unforeseeable effect on those participants. In essence, perhaps control participants sensed the neutrality of their assigned writing task, and, upon returning for the follow-up session were more hostile because they believed that their time had been wasted.

Alternately, despite the fact that the precise mechanism by which written disclosure influences emotional reactivity in this population is not known, the assumption that it is a direct effect has taken on a conventional wisdom status. The present data may indicate that hostility is the manifestation of a trait-like characteristic (Suls, Wan, & Costa, 1995) and that it is only modified indirectly over time through changes in health behaviors, similar to those observed in the experimental group in this study. Longer outcome intervals are needed to address this possibility.

Taken alone, the finding that greater daily stress was sustained by experimental participants could suggest that the experimental manipulation was ineffective in improving that aspect of psychological well-being, and even may have been detrimental. An alternate explanation exists, however. There may be unique factors associated with essential hypertension which influenced reports of perceived stress in a manner contradictory to the hypotheses of the study. It is possible that both groups actually experienced similar levels of daily stress, but a differential in reported daily stress emerged in the experimental participants as a result of participating in the structured writing task. For example, the act of writing about upsetting events may have resulted in an increased awareness of and willingness to address negative daily issues more openly. In contrast, individuals in the control condition may have been less willing to disclose or even acknowledge the degree of stress caused by daily events (Handkins & Munz, 1978), particularly in the absence of acquiring greater numbers of health behaviors, as was observed in experimental participants.

Although diminished perceptions of daily stress in the short-term may appear to be a desirable state, this strategy may have longer-term negative consequences such as fostering other psychosocial correlates of hypertension. Results from the present study suggest that one cost of not acknowledging daily stressors is increased hostility. Interestingly, although participants in the experimental condition appeared to be willing to acknowledge more daily stress than controls, they also evidenced less hostility. Because empirical evidence strongly supports the association between hostility and cardiovascular reactivity during discrete stressors, particularly interpersonal conflict (Houston et al.,

1989), any intervention that can neutralize hostility may also diminish cardiovascular reactivity during such conflict.

Study Limitations

Although baseline group differences were statistically controlled at follow-up, it is possible that baseline differences that disappeared at follow-up represent a natural tendency for extreme scores to demonstrate regression toward the mean, thus restricting meaningful between-group comparisons. Although some group differences emerged at follow-up, it is possible that the study sample size was insufficient to represent the larger population of individuals diagnosed with essential hypertension. In addition, this sample of individuals was almost exclusively Caucasian and was not culturally representative of all individuals with essential hypertension. Thus, comparison of these findings to individuals with different cultural backgrounds should be done cautiously.

Other selection biases may have also occurred in the present study. Psychosocial factors specific to hypertension may also have restricted the study sample such that it was a nonrepresentative subset of the larger hypertensive population. For example, participants willing to attend five sessions in the laboratory may have harbored less cynical hostility than the typical individual with hypertension. Similarly, individuals with high levels of hostility or mistrust of others may not have been inclined to volunteer for study participation initially, or they may have dropped out when they learned that participation involved personal disclosure. Indeed, data from six of the 39 participants initially recruited had to be excluded due to failure to either complete all of the sessions or to engage in their assigned writing task. At the same time, these six non-completers did not differ on most of

the variables measured in the present study. They did, however, endorse more health behaviors compared to all completers at baseline. In fact, non-completers' reported health behaviors at baseline exceeded the levels attained by completers in the experimental group at the three-month follow-up. This may have dramatically diminished non-completers' motivation to participate due to a lack of perceived need to address health-related issues.

Also, study participants also may have held different attitudes regarding responsibility for their own physical health than non-participant hypertensives. Nearly all participants reported anecdotally that they tended to be highly compliant with their medication regimen. Although there are problems inherent to self-reported medication compliance, if these reports were accurate, it suggests that study participants were unlike approximately two-thirds of hypertensive patients who are non-compliant with their medication (Dunbar-Jacob et al., 1991).

Additional procedural issues that arose while recruiting participants for this study may also limit the conclusions drawn from these data. Previous written disclosure studies (e.g., Pennebaker & Beall, 1986, Greenberg & Stone, 1992) have generally included frequencies of self-reported physician visits (i.e., health care utilization at follow-up compared to baseline) as an index of physical health. The present study was initially designed to recruit all participants exclusively from a local physician's office, and reported health care utilization was to be corroborated by independent physician reports. However, insufficient numbers of hypertensive patients from this physician's office were willing to participate in the study, requiring recruitment of participants from the broader community. Because participants recruited from the community were under treatment by numerous different physicians, physician-corroborated health care utilization became infeasible.

Studies that assessed health care utilization typically used self-report of physician visits specifically for *illness* (i.e., excluding any and all physician visits for physical injury, or other regular medical check-ups). However, there is a theoretical basis supporting the elimination of this particular health outcome measure with a hypertensive population. Due to the regular nature of medical care that individuals with essential hypertension receive to treat their condition (e.g., regularly scheduled medication monitoring and visits to their physician), self-report frequencies of doctor visits may not supply meaningful information, or could be confounded with this population. Specifically, hypertensive patients might be less likely to attend discrete physician visits for illness compared to non-chronically ill patients. In other words, hypertensive patients might wait until their next scheduled appointment for treatment of minor illnesses if it is soon, rather than being charged for a separate office visit. Thus, even if this type of information had been gathered, there is reason to doubt its utility with this particular population.

Research Implications

Notwithstanding these limitations, findings from the present study add to the overall understanding of how circumscribed emotion-focused disclosure of unpleasant events may contribute to improvements in physical health and psychological well being in a clinical population of individuals diagnosed with essential hypertension. Specifically, these findings suggest that structured written emotional disclosure may have useful applications for improving health behaviors in individuals with essential hypertension, which are major mediating factors in the successful management of this illness. Perhaps more important was the finding that participants who engaged in emotional disclosure

showed significantly greater health behaviors and less hostility than the control group participants, despite the fact that they maintained relatively higher levels of perceived daily stress throughout the course of the study.

Thus, written emotional disclosure may have utility for impacting specific psychosocial factors associated with hypertension, such as cynical hostility and cognitive appraisal of stressful events. Additionally, given that personality variables associated with hypertension may contribute to treatment non-compliance, interventions targeting specific psychosocial variables such as hostility may improve compliance and overall effectiveness of primary medical treatments. The findings of the present study may contribute to the development of potential nonpharmacological treatments for essential hypertension which address the psychosocial components of hypertension (e.g., hostility, health behaviors) which, when combined with traditional medical interventions, could provide for more complete and effective treatment of the disease.

REFERENCES

- Berry, D. S., & Pennebaker J. W. (1993). Nonverbal and verbal emotional expression and health. Psychotherapy and Psychosomatics, 59, 11-19.
- Booth, R. J., Petrie, K. J., & Pennebaker, J. W. (1997). Changes in circulating lymphocyte numbers following emotional disclosure: Evidence of buffering? Stress Medicine, 13, 23-29.
- Breuer, J., & Freud, S. (1966). Studies of hysteria. New York, NY: Avon Books. (Original work published in 1895).
- Brantley, P. J., Waggoner, C. D., Jones, G. N., & Rappaport, N. B. (1987). A daily stress inventory: Reliability and validity. Journal of Behavioral Medicine, 10(1), 61-74.
- Byrne, D. G., & Caddy, G. R. (Eds.). (1992). Behavioral medicine: International perspectives. Norwood, NJ: Alex Publishing Corporation.
- Christensen, A. J., & Smith, T. W. (1993). Cynical hostility and cardiovascular reactivity during self-disclosure. Psychosomatic Medicine, 55, 193-202.
- Cumes, D. P. (1983). Hypertension, disclosure of personal concerns, and blood pressure response. Journal of Clinical Psychology, 39(3), 376-381.
- Cumes-Rayner, D. P. & Price, J. (1989). Understanding hypertensive behaviour – I. Preference not to disclose. Journal of Psychosomatic Research, 33(1), 63-74.
- Derogatis, L. R. (1975). Brief Symptom Inventory. Baltimore, MD: Clinical Psychometric Research
- Derogatis, L. R. & Melisaratos, N. (1983). The brief symptom inventory: An introductory report. Psychological Medicine, 13, 595-605.
- Donnelly, D. A., & Murray, E. J. (1991). Cognitive and emotional changes in written essays and therapy interviews. Journal of Social and Clinical Psychology, 10(3), 334-350.

Dunbar-Jacob, J., Dwyer, K., & Dunning, E. J. (1991). Compliance with antihypertensive regimen: A review of the research in the 1980's. Annals of Behavioral Medicine, 13 (1), 31-39.

Eisenberg, N., Fabes, R. A., Murphy, B., Karbon, M., Maszk, P., Smith, M., O'Boyle, C., & Suh, K. (1994). The relations of emotionality to dispositional and situational empathy-related responding. Journal of Personality and Social Psychology, 66, 776-797.

Eisenberg, N., Fabes, R. A., Murphy, B., Maszk, P., Smith, M., Karbon, M. (1995). The relations of emotionality and regulation in children's social and academic functioning: a longitudinal study. Child Development, 66, 1360-1385.

Elder, S. T., Geoffroy, D. J., & McAfee, R. D. (1981). Essential hypertension: A behavioral perspective. In S. N. Haynes and L. Gannon (Eds.), Psychosomatic disorders: A physiological approach to etiology and treatment (pp. 359-399). New York, NY: Praeger.

Esterling, B. A., Antoni, M. H., Fletcher, M. A., Margulies, S., & Schneiderman, N. (1994). Emotional disclosure through writing or speaking modulates latent Epstein-Barr antibody titers. Journal of Consulting and Clinical Psychology, 62(1), 130-140.

Evans, P. (1991). Stress and Coping. In M. Pitts & K. Phillips (Eds.), The psychology of health: An introduction (pp.30-45). London: Routledge.

Fawzy, F. I., Fawzy, N. W., Hyun, C. S., Elashoff, R., Guthrie, D., Fahey, J. L., & Morton, D. L. (1993). Malignant melanoma: Effects of an early structured psychiatric intervention, coping, and affective state on recurrence and survival 6 years later. Archives of General Psychiatry, 50, 681-689.

Fisher, S., Murray, K., & Frazer, N. (1985). Homesickness, health and efficiency in first year college students. Journal of Environmental Psychology, 5, 181-195.

Foa, E. B., Molnar, C., & Cashman, L. (1995). Changes in rape narratives during exposure therapy for Posttraumatic Stress disorder. Journal of Traumatic Stress, 8(4), 675-690.

Foa, E. B. & Riggs, D. S. (1993). Posttraumatic stress disorder and rape. In J. Oldham, M. B. Riba, & A. Tasman (Eds.), American Psychiatric Press Review of Psychiatry (Vol. 12, pp. 273-303). Washington, DC: American Psychiatric Press.

Forston, M. T. (1991). Disclosure of traumatic events utilizing a writing task: Immunological, physiological, and psychological consequences in a psychiatric population. Unpublished doctoral dissertation, Auburn University, Auburn, AL.

Francis, M. E., & Pennebaker, J. W. (1992). Putting stress into words: the impact of writing on physiological, absentee, and self-reported emotional well-being measures. American Journal of Health Promotion, 6(4), 280-287.

Futterman, A. D., Kemeny, M. E., Shapiro, D., & Fahey, J. L. (1994). Immunological and physiological changes associated with induced positive and negative mood. Psychosomatic Medicine, 56, 499-511.

Genest, J., Kuchel, O., Hamet, P., & Cantin, M. (1983). Hypertension: Physiopathology and Treatment, (2nd Ed.), New York, NY: McGraw-Hill.

Gidron, Y., Peri, T., Connolly, J. F., & Shalev, A. Y. (1996). Written disclosure in posttraumatic stress disorder: Is it beneficial for the patient? Journal of Nervous and Mental Disease, 184(8), 505-507.

Glaser, R., Kiecolt-Glaser, J. K., Bonneau, R. H., Malarkey, W., Kennedy, S., & Hughes, J., (1992). Stress-induced modulation of the immune response to recombinant hepatitis B vaccine. Psychosomatic Medicine, 54, 22-29.

Goldstein, H. S., Edelberg, R., Meier, C. F., & Davis, L. (1988). Relationship of resting blood pressure and heart rate to experienced anger and expressed anger. Psychosomatic Medicine, 50, 321-329.

Greenberg, M. A., & Stone, A. A. (1992). Emotional disclosure about traumas and its relation to health: effects of previous disclosure and trauma severity. Journal of Personality and Social Psychology, 63(1), 75-84.

Greenberg, M. A., Wortman, C. B., & Stone, A. A. (1996). Emotional expression and physical health: Revising traumatic memories or fostering self-regulation? Journal of Personality and Social Psychology, 71(3), 588-602.

Handkins, R. E., & Munz, D. C. (1978). Essential hypertension and self-disclosure. Journal of Clinical Psychology, 34(4), 870-875.

Harber, K. D., & Pennebaker, J. W. (1992). Overcoming traumatic memories. In S. A. Christianson (Ed.), The handbook of emotion and health, (pp. 359-386). Hillsdale, NJ: Erlbaum.

Helmets, K. F. & Krantz, D. S. (1996). Defensive hostility, gender and cardiovascular levels and responses to stress. Annals of Behavioral Medicine, 18(4), 246-254.

Houston, B. K., Smith, M. A., & Cates, D. S. (1989). Hostility patterns and cardiovascular reactivity to stress. Psychophysiology, 26(3), 337-342.

Horowitz, M., Wilner, N., Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. Psychosomatic Medicine, 41, 209-218.

Hughes, C. F., Uhlmann, C., & Pennebaker, J. W. (1994). The body's response to processing emotional trauma: linking verbal text with autonomic activity. Journal of Personality, 62, 565-585.

Jacob, R. G., Chesney, M. A., Williams, D. M., Ding, Y., & Shapiro, A. P. (1991). Relaxation therapy for hypertension: Design effects and treatment effects. Annals of Behavioral Medicine, 13(1), 5-17.

Jamner, L. D., Schwartz, G. E., & Leigh, H. (1988). The relationship between repressive and defensive coping styles and monocyte, eosinophile, and serum glucose levels: Support for the opioid peptide hypothesis of repression. Psychosomatic Medicine, 50, 567-575.

Jensen, M. R. (1987). Psychobiological factors predicting the course of breast cancer. Journal of Personality, 55, 317-342.

Johnston, D. W. (1985). Invited review: Psychological interventions in cardiovascular disease. Journal of Psychosomatic Research, 29(5), 447-456.

Jorgensen, R. S. & Houston, K. (1988). Cardiovascular reactivity, hostility, and family history of hypertension. Psychotherapy and Psychosomatics, 50, 216-222.

Jorgensen, R. S., Johnson, B. T., Kolodziej, M. E., & Schreer, G. E. (1996). Elevated blood pressure and personality: A meta-analytic review. Psychological Bulletin, 120(2), 293-320.

Kaufmann, P. G., Jacob, R. O., Ewart, C. K., Chesney, M. A., Muenz, L. R., Doub, N., & Mercer, W. (1988). Hypertension Intervention pooling project. Health Psychology, 7, 209-224.

Kelley, J. E., Lumley, M. A., & Leisen, J. C. C. (1997). Health effects of emotional disclosure in rheumatoid arthritis patients. Health Psychology, 16(4), 331-340.

Kiecolt-Glaser, J. K., & Glaser, R. (1986). Psychological influences on immunity. Psychosomatics, 27(9), 621-624.

Kiecolt-Glaser, J. K., & Glaser, R. (1992). Psychoneuroimmunology: Can psychological interventions modulate immunity? Journal of Consulting and Clinical Psychology, 60(4), 569-575.

Larson, D. G., & Chastain, R. L. (1990). Self-concealment: Conceptualization, measurement, and health implications. Journal of Social and Clinical Psychology, 9(4), 439-455.

Larson, M. R. & Langer, A. W. (1997). Defensive hostility and anger expression: Relationship to additional heart rate reactivity during active coping. Psychophysiology, 34, 177-184.

Lee, D., Mendes de Leon, C. F., Jenkins, D., Croog, S. H., Levine, S., & Sudilovsky, A. (1992). Relation of hostility to medication adherence, symptom complaint, and blood pressure reduction in a clinical field trial of antihypertensive medication. Journal of Psychosomatic Research, 36(2), 181-190.

Lutgendorf, S. K., Antoni, M. H., Kumar, M., & Schneiderman, N. (1994). Changes in cognitive coping strategies predict EBV-antibody titre change following a stressor disclosure induction. Journal of Psychosomatic Research, 38(1), 63-78.

Mann, S. J., & Delon, M. (1995). Improved hypertension control after disclosure of decades-old trauma. Psychosomatic Medicine, 57, 501-505.

Meyer, T. J., & Mark, M. M. (1995). Effects of psychosocial interventions with adult cancer patients: A meta-analysis of randomized experiments. Health Psychology, 14 (2), 101-108.

Murray, E. J., Lamnin, A. D., & Carver, C. S. (1989). Emotional expression in written essays and psychotherapy. Journal of Social and Clinical Psychology, 8(4), 414-429.

Pennebaker, J. W. (1982). The Psychology of Physical Symptoms. New York, NY: Springer-Verlag.

Pennebaker, J. W. (1985). Traumatic experience and psychosomatic disease: Exploring the roles of behavioural inhibition, obsession, and confiding. Canadian Psychology, 26(2), 82-95.

Pennebaker, J. W. (1989). Confession, inhibition, and disease. In L. Berkowitz (Ed.), Advances in Experimental and Social Psychology (Vol. 22, pp. 211-244). New York, NY: Academic Press.

Pennebaker, J. W. (1993). Putting stress into words: health, linguistic, and therapeutic implications. Behavior, Research, and Therapy, 31, 539-548.

Pennebaker, J. W. (1995). Emotion, Disclosure, and Health. Washington, DC: American Psychological Association.

Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. Psychological Science, 8(3), 162-166.

Pennebaker, J. W., Barger, S. D., & Tiebout, J. (1989). Disclosure of traumas and health among Holocaust survivors. Psychosomatic Medicine, 51, 577-589.

Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: toward an understanding of inhibition and disease. Journal of Abnormal Psychology, 95(3), 274-281.

Pennebaker, J. W., Colder, M., & Sharp, L. K. (1990). Accelerating the coping process. Journal of Personality and Social Psychology, 58(3), 528-537.

Pennebaker, J. W., & Francis, M. E. (1996). Cognitive, emotional, and language processes in disclosure. Cognition and Emotion, 10(6), 601-626.

Pennebaker, J. W., & Hoover, C. W. (1986). Inhibition and cognition: Toward an understanding of trauma and disease. In R. J. Davidson, G. E. Schwartz, & D. Shapiro (Eds.), Consciousness and self-regulation (pp. 107-136). New York, NY: Plenum Press.

Pennebaker, J. W., Hughes, C., & O'Heeron, R. (1987). The psychophysiology of confession: linking inhibitory and psychosomatic processes. Journal of Personality and Social Psychology, 52, 781-793.

Pennebaker, J. W., Kiecolt-Glaser, J. K., & Glaser, R. (1988). Disclosure of traumas and immune function: health implications for psychotherapy. Journal of Consulting and Clinical Psychology, 56(2), 239-245.

Pennebaker, J. W., & Susman, J. R. (1988). Disclosure of traumas and psychosomatic processes. Social Sciences Medicine, 26(3), 327-332.

Petrie, K. J., Booth, R. J., Pennebaker, J. W., Davison, K. P., & Thomas, M. G. (1995). Disclosure of trauma and immune response to a Hepatitis B vaccination program. Journal of Consulting and Clinical Psychology, 63(5), 787-792.

Pitts, M. & Phillips, K. (1991). The psychology of health: An introduction. London, UK: Routledge

Pope, M. K., & Smith, T. W. (1991). Cortisol excretion in high and low cynically hostile men. Psychosomatic Medicine, 53, 386-392.

Rachman, S. (1980). Emotional processing. Behavior, Research and Therapy, 18, 51-60.

Rosen, R. C., Brondolo, E., & Kostis, J. B. (1993). Nonpharmacological treatment of essential hypertension: Research and clinical applications. In R. J. Gatchel and E. B. Blanchard (Eds.), Psychophysiological disorders (pp. 63-110). Washington, DC: American Psychological Association.

Russo, K. R., & Zuckerman, M. (1992). Psychological, physiological, and physical characteristics of subjects at risk for essential hypertension. Personality and Individual Differences, 13(1), 61-68.

Saxena, (1982). Effect of hostility level on self-disclosure in university students in India. Journal of Psychological Researches, 26(1), 35-42.

Scheff, T. J. (1979). Catharsis in healing, ritual, and drama. Berkeley, CA: University of California Press.

Sommers-Flanagan, J. & Greenberg, R. P. (1989). Psychosocial variables and hypertension. The Journal of Nervous and Mental Disease, 177(1), 15-24.

Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. Journal of Consulting and Clinical Psychology, 66(1), 174-184.

Smyth, J.M., Stone, A.A., Hurewitz, A., & Kaell, A. (1999). Effects of writing about stressful experiences on symptom reduction in patients with asthma and rheumatoid arthritis: A randomized trial. Journal of the American Medical Association, 281(14), 1304-1309.

Spera, S. P., Buhrfeind, E. D., & Pennebaker, J. W. (1994). Expressive writing and coping with job loss. Academy of Management Journal, 37(3), 722-733.

Stern, R. & Marks, I. (1973). Brief and prolonged flooding. Archives of General Psychiatry, 28, 270-276.

Vandervoort, D. J., Ragland, D. R., & Syme, S. L. (1996). Expressed and suppressed anger and health problems among transit workers. Current Psychology, 15, 179-193.

Wadden, T. A., Luborsky, L., Greer, S., & Crits-Cristoph, P. (1984). The behavioral treatment of essential hypertension: An update and comparison with pharmacological treatment. Clinical Psychology Review, 4, 403-429.

Wahler, H. J. (1968). The physical symptoms inventory: Measuring levels of somatic complaining behavior. Journal of Clinical Psychology, 24(2), 207-211.

Weinfurt, K. P. (1995). Multivariate Analysis of Variance. In Grimm, L. G., & Yarnold P. R (Eds.), Reading and understanding multivariate statistics. Washington DC: American Psychological Association.

APPENDIXES

no of

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Male Female

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APPENDIX A

DEMOGRAPHICS QUESTIONNAIRE

1. How old are you? _____ years
2. What is your gender? Male _____ Female _____
3. What is your primary race or ethnic origin? (please circle one)
 - a) Caucasian
 - b) Native American
 - c) Asian
 - d) African American / Black
 - e) Hispanic
 - f) Other (specify) _____
4. How would you best describe your current marital status? (please circle one)
 - a) Single, no current relationship
 - b) Single, in a committed relationship
 - c) Married
 - d) Other (specify) _____
5. If you answered "married", then how many years have you been married?
_____ years
6. Do you have any children? Yes _____ No _____
7. If yes, how many children do you have? _____ children
8. What is your current employment status? (please circle one).
 - a) Employed
 - b) Unemployed or between jobs
 - c) Retired
9. If you answered "a)" for question 7, please briefly describe your job.

10. What is your approximate household income?

11. When were you first diagnosed with hypertension and how long have you been seeing your physician for treatment of your hypertension?

12. What medication or medications do you currently take for your hypertension?

13. Do you ever forget to take your blood pressure medication? Yes___ No___

14. Are you careless at times about taking your blood pressure medication?
Yes___ No___

15. When you feel better do you sometimes stop taking your blood pressure medication?
Yes___ No___

16. Sometimes if you feel worse when taking your blood pressure medicine, do you stop taking it? Yes___ No___

17. How would you rate the severity of your hypertension? (please circle one number)

1	2	3	4	5	6	7
Not at all			Serious	Serious		Very

18. Do you suffer from any ongoing medical condition (in addition to hypertension) that requires regular medical treatment (such as diabetes or asthma)?
Yes___ No___ (If No, then skip question 19)

19. If yes, please describe any condition(s) and how long you have suffered from the condition(s).

20. How would you rate your current state of overall physical health? (please circle one number)

1	2	3	4	5	6	7
Poor						Excellent

21. How would you rate your current level of social support? (friends or family members that you can talk to, rely on etc.)

1	2	3	4	5	6	7
Poor						Excellent

22. Have you ever seen, or are you currently seeing a counselor or therapist?

Yes___ No___

Health Behavior Questionnaire (e.g., cigarettes, alcohol, etc.)

1988-1992

1993

1994

1995

1996

1997

APPENDIX B

HEALTH BEHAVIOR QUESTIONNAIRE

1998

Please mark the appropriate answer

1. Have you ever regularly smoked tobacco (e.g., cigarettes, cigars, or a pipe)?

Yes ___ No ___

2. Do you *presently* smoke tobacco (e.g., cigarettes, cigars, or a pipe)?

Yes ___
No ___

(*If No, then skip to question 4)

3. How frequently do you smoke?

___ Once a week or less
___ Once or twice per day
___ 3 to 5 times per day
___ 6 to 10 times per day
___ More than 10 times per day

4. Do you drink alcohol?

___ No, or up to 2 drinks per month
___ About one drink per week
___ About 2 to 4 drinks per week
___ About 5 to 10 drinks per week
___ More than 11 drinks per week

5. Do you take any drugs or medication *other than* your blood pressure medication, tea, coffee, alcohol, or nicotine (such as sleeping tablets, anti-anxiety drugs such as Valium, anti-depressants, hallucinogens, barbiturates, painkillers, etc.)?

___ No
___ Once or twice per year
___ Once or twice per month
___ Once or twice per week
___ Every day

6. How often do you exercise or go for a walk? (For at least 15 minutes each time)?

___ Daily
___ 3 or more times per week
___ Once or twice per week
___ Once or twice per month
___ Rarely

7. How frequently do you participate in an activity or recreation that you enjoy (e.g., gardening, reading, hobbies, sport, etc.)?

- Daily
 3 or more times per week
 Once or twice per week
 Once or twice per month
 Rarely

8. How often do you do any relaxation exercises?

- Daily
 3 or more times per week
 Once or twice per week
 Once or twice per month
 Rarely

9. How often do you eat a serving of fruits and/or vegetables?

- 3 to 5 times per day
 1 to 3 times per day
 3 times per week
 Once per week
 Rarely

10. How often do you eat fatty or sweet foods (such as fat on meat, pies, fried foods, cheeses, full cream products, chocolate, etc.)?

- 3 to 5 times per day
 1 to 3 times per day
 3 times per week
 Once per week
 Rarely

11. How often do you give and receive affection?

- Frequently each day
 Occasionally each day
 Once or twice per week
 Once or twice per month
 Rarely or never

12. How often do you have a good nights sleep?

- Most nights
- About every other night
- About once per week
- About once per month
- Rarely

13. Do you drink tea or coffee?

- Rarely
- 3 to 5 cups per week
- 2 to 3 cups per day
- 4 to 6 cups per day
- 7 or more cups per day

BY APPOINTMENT

Do consider the last days of your writing. Please circle date of 1

1984

1985
1986

1987
1988



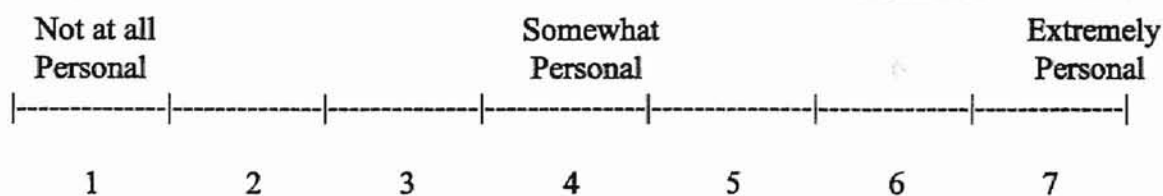
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APPENDIX C

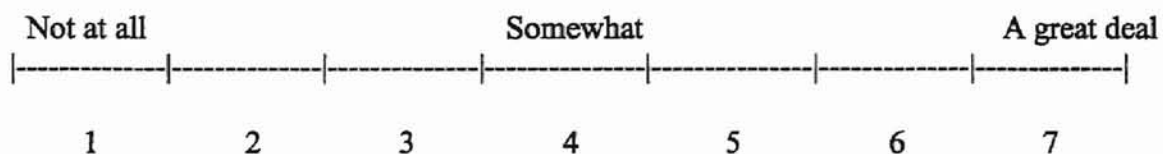
ESSAY EVALUATION MEASURE

In answering the following questions, consider all four days of your writing. Please circle the most appropriate number on the scale of 1 to 7.

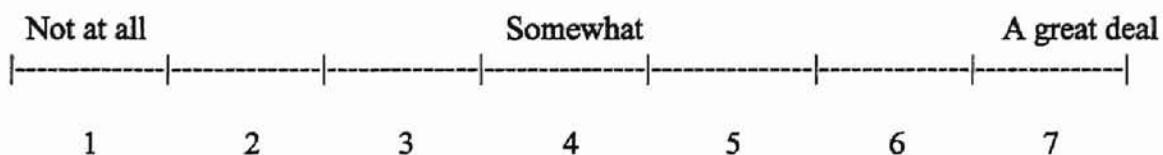
- 1) Overall, how personal was the topic that you wrote about?



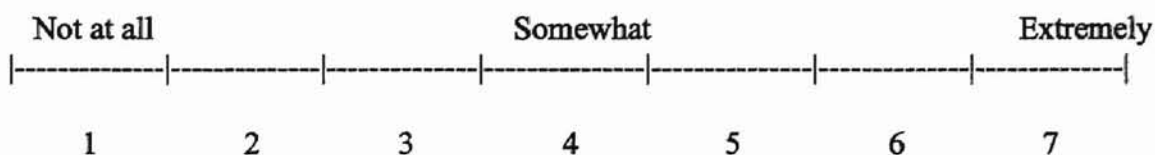
- 2) Prior to your participation in this study, how much had you talked with other people about what you wrote?



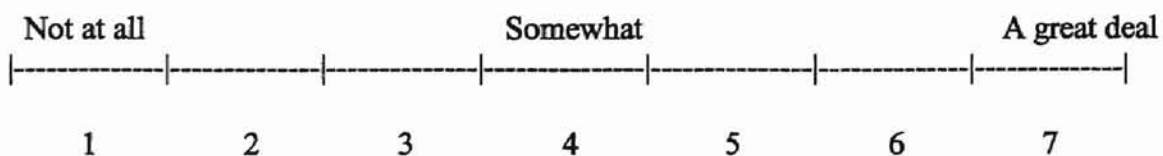
- 3) Overall, how much did you include your emotional reactions in what you wrote?



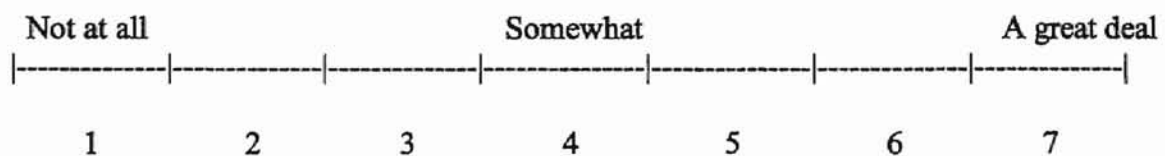
- 4) Over the four days of your participation, how difficult has it been for you to write?



- 5) Since the beginning of the study, (but not during hours that you were here participating) to what degree have you thought about the topics that you wrote about?



6) Before the study ever began, to what degree did you think about the topics that you wrote about?



100.00

distributed on this scale of 1 to 7

A fair deal

A great deal

100.00

1

100.00

100.00

100.00

100.00

100.00

100.00

100.00

100.00

100.00

100.00

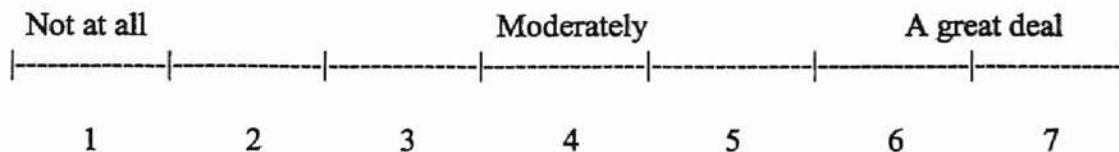
100.00

100.00

APPENDIX D

ESSAY INFLUENCE MEASURE

Please answer the following questions using this scale of 1 to 7:



1. _____ Since your participation in this study three months ago, how much have you thought about what you wrote in your essays?
2. _____ Since your participation in this study three months ago, how much have you talked to other people about what you wrote in your essays?
3. _____ Looking back on this study, to what degree do you feel that your participation has had a long-lasting positive effect on you?
4. _____ Looking back on this study, to what degree do you feel that your participation has had a long-lasting negative effect on you?
5. _____ Since your participation in the study, how happy have you felt?
6. _____ Since your participation in the study, how sad or depressed have you felt?
7. _____ Looking back on this study, to what degree has this experiment been valuable or meaningful to you?

8

[Contents](#)[Experimental](#)**APPENDIX E****TABLES AND FIGURES**

Table 1

Descriptive Statistics of the Study Sample

	<u>Condition</u>	
	<u>Control</u>	<u>Experimental</u>
Total <u>n</u>	16	17
Gender (<u>n</u>)		
Male	4	5
Female	12	12
Ethnicity (<u>n</u>)		
Caucasian	16	16
African American	0	1
*Age		
<u>M</u>	64.13	54.35
<u>SD</u>	9.83	12.24
Household Income		
<u>M</u>	\$41,312	\$58,750
<u>SD</u>	\$28,947	\$26,193

Note. * $p < .05$

Table 2

Physical and Psychological Group Mean Differences at Baseline

	<u>Condition</u>			
	<u>Control</u>		<u>Experimental</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Physical Health				
Systolic blood pressure	142.06	21.39	140.41	21.67
Diastolic blood pressure	74.81	10.04	80.76	13.41
Heart rate	74.20	10.46	72.67	8.17
*Physical symptoms	15.56	6.88	22.24	8.07
*Health behaviors	30.50	5.75	26.35	4.64
Psychological Well-being				
Positive affect	29.63	9.80	25.59	6.76
*Negative affect	10.69	1.20	12.35	2.29
*Psychological symptoms	.45	.36	.79	.45
Daily stress	40.94	52.44	54.47	34.40
Hostility	15.81	5.31	16.41	4.60

Note. * $p < .05$

Table 3

Physical and Psychological Group Mean Differences at Follow-up

	<u>Condition</u>		<u>Eta Squared</u>	<u>Observed Power</u>
	<u>Control</u>	<u>Experimental</u>		
Physical Health				
Systolic blood pressure	145.46	141.31	.02	.10
Diastolic blood pressure	84.38	81.84	.02	.12
Heart rate	69.51	70.60	.00	.05
Physical symptoms	17.43	17.54	.00	.04
**Health behaviors	27.16	31.02	.22	.78
Psychological Well-being				
Positive affect	32.64	32.38	.00	.04
Negative affect	16.69	18.39	.02	.16
Psychological symptoms	.55	.57	.00	.04
*Daily stress	28.88	44.91	.16	.60
*Hostility	18.30	15.02	.13	.52

Note. Means have been adjusted to control for age and baseline scores for each dependent variable.

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

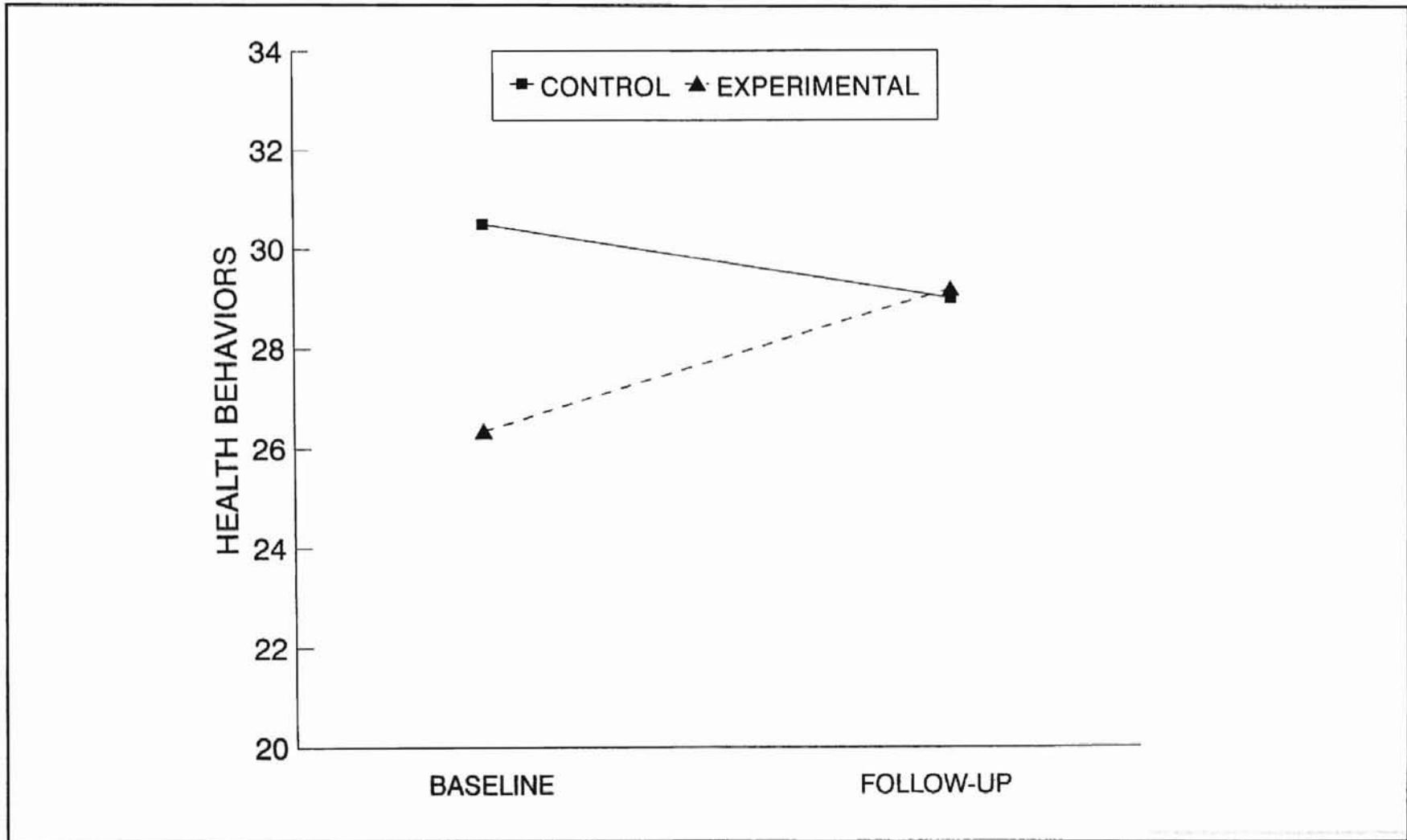


Figure 1. Comparison of Health Behavior Change Over Time (Baseline to Follow-up) Between the Experimental and Control Groups.

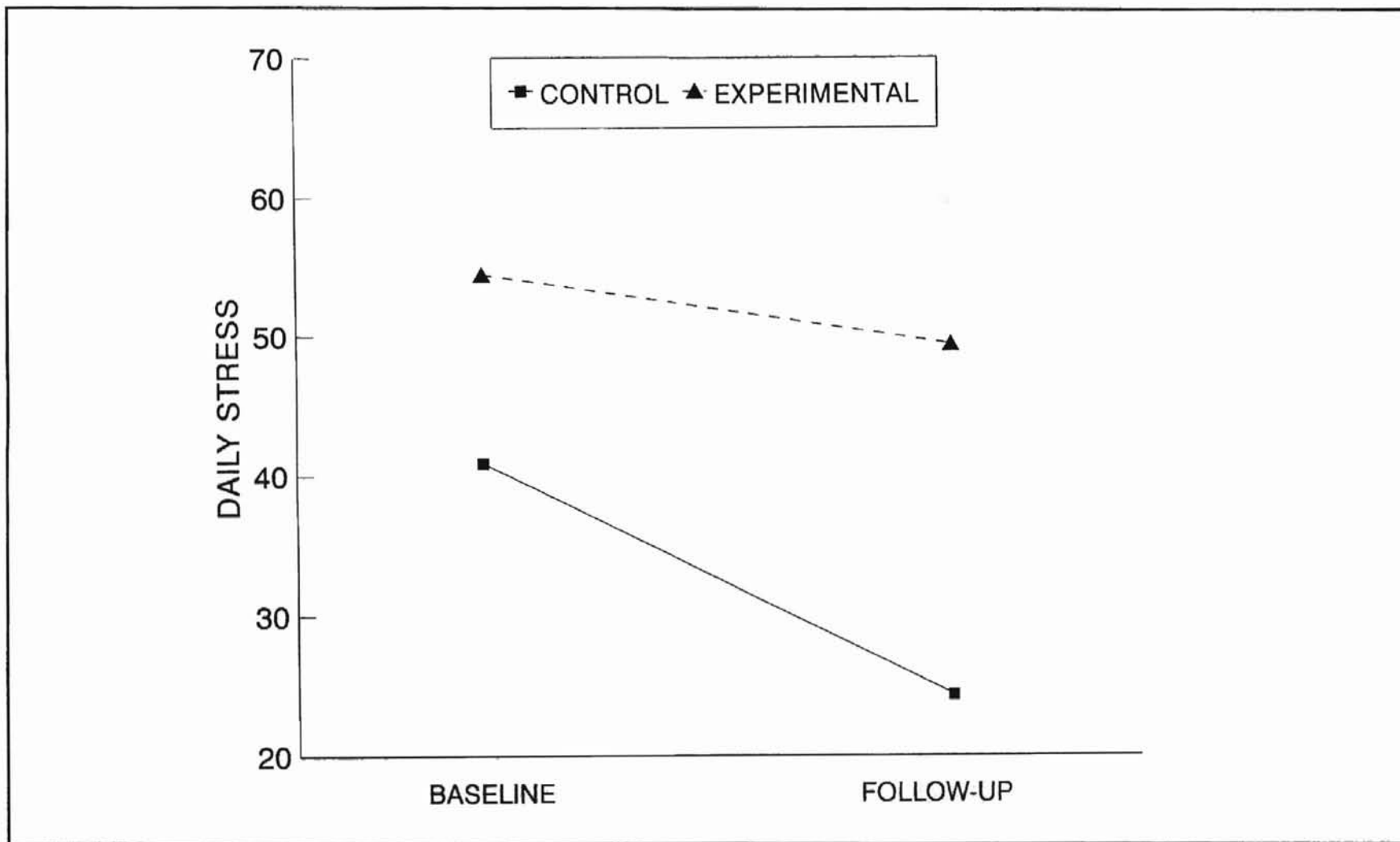


Figure 2. Comparison of Daily Stress Change Over Time (Baseline to Follow-up) Between the Experimental and Control Groups.

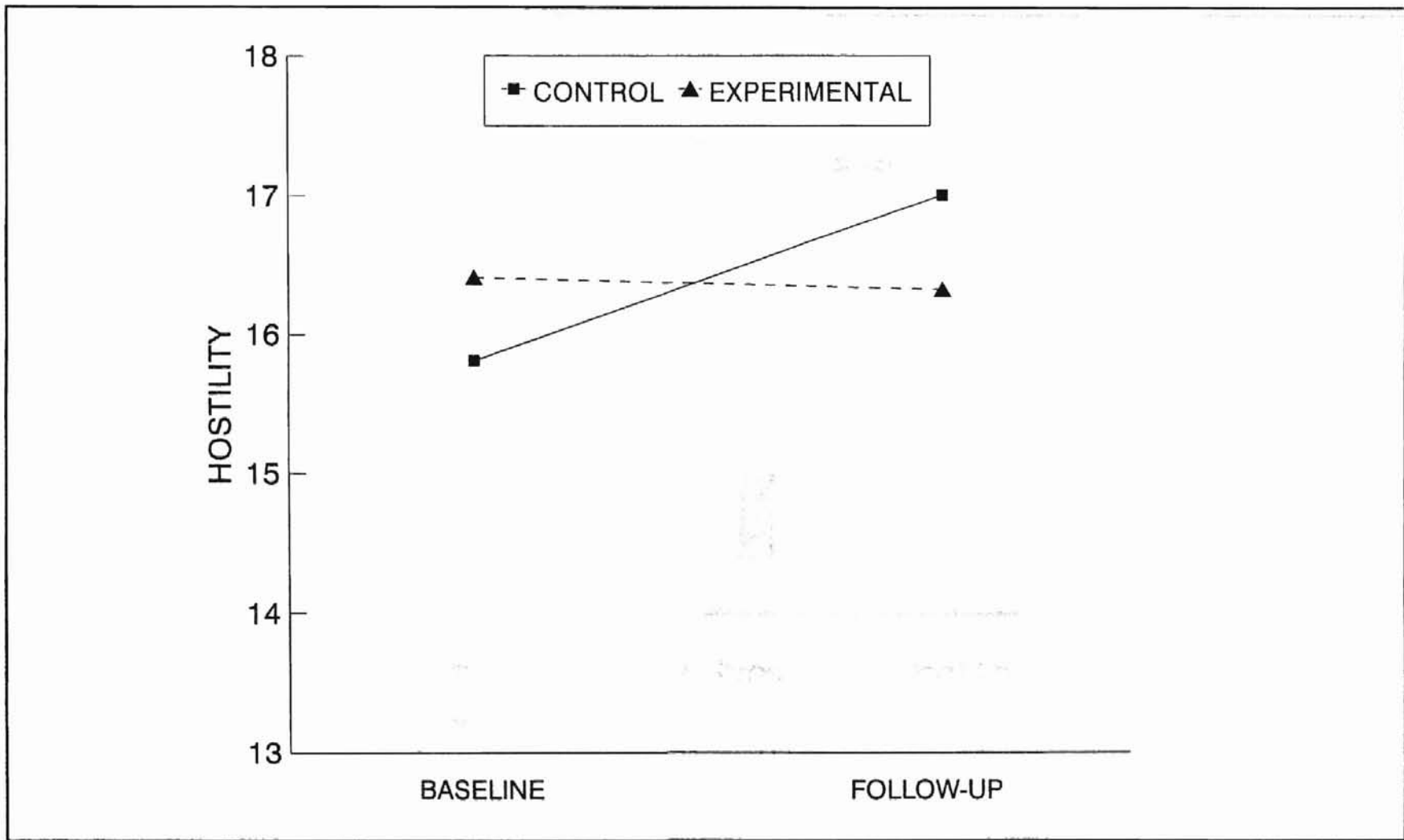


Figure 3. Comparison of Hostility Change Over Time (Baseline to Follow-up) Between the Experimental and Control Groups.

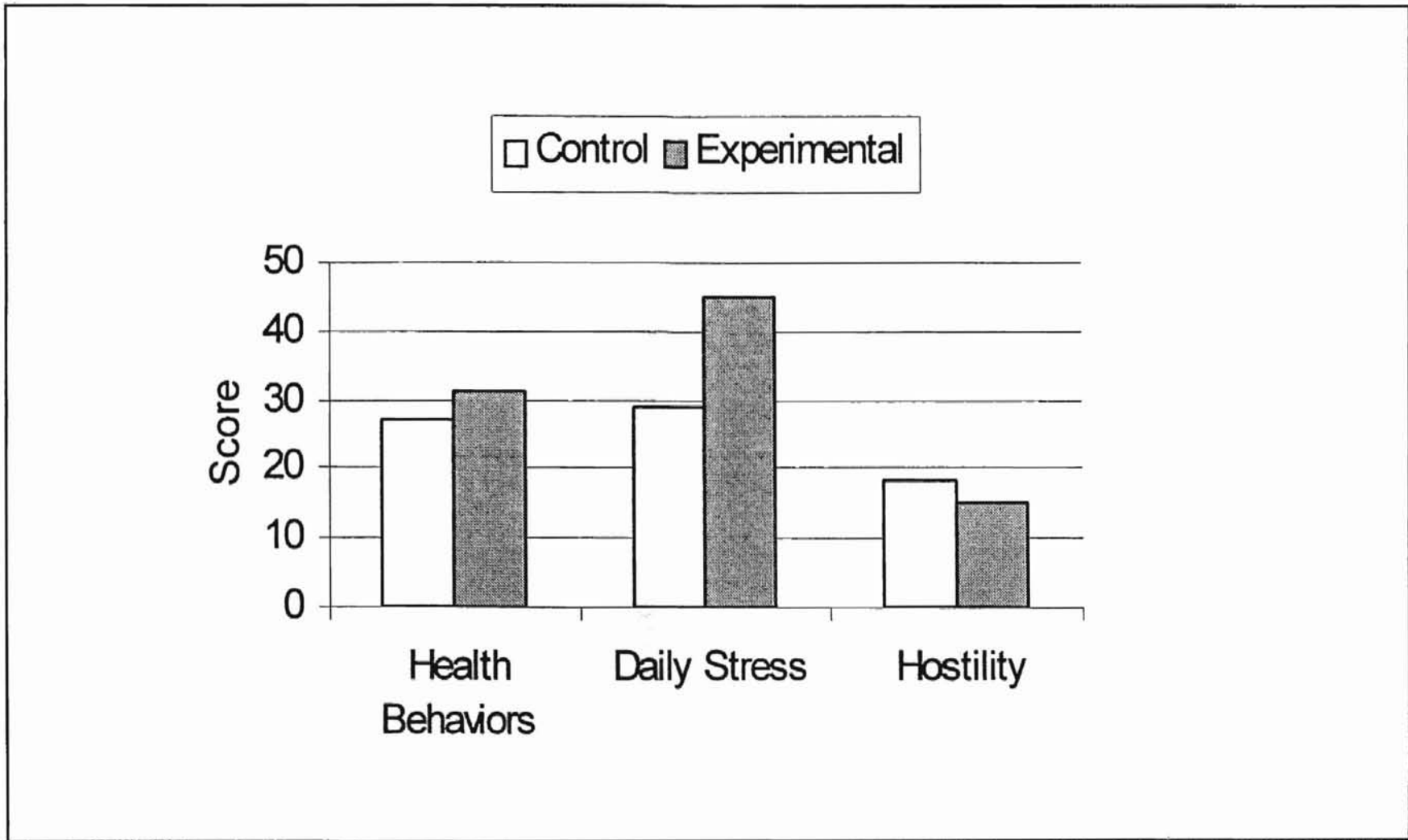


Figure 4. Between Group Differences at Three-month Follow-up (Controlling for Baseline Levels and Age) for Health Behaviors, Daily Stress, and Hostility.

APPENDIX F

INSTITUTIONAL REVIEW BOARD

APPROVAL FORM

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

DATE: 07-31-98

IRB #: AS-99-001

Proposal Title: THE IMPACT OF WRITTEN DISCLOSURE ON
HYPERTENSION

Principal Investigator(s): Sue Orsillo, Michael McLaughlin

Reviewed and Processed as: Modification

Approval Status Recommended by Reviewer(s): Approved

Signature:



Date: March 10, 1999

Carol Olson, Director of University Research Compliance
cc: Michael McLaughlin

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

VITA

Michael Stuart McLaughlin

Candidate for the Degree of

Master of Science

Thesis: THE IMPACT OF WRITTEN DISCLOSURE ON HYPERTENSION

Major Field: Psychology

Biographical:

Personal Data: Born in Gardiner, Maine, On April 6, 1967, the son of Dennis and Marjorie McLaughlin.

Education: Graduated from Stillwater High School, Stillwater, Oklahoma in May, 1985; received a Bachelor of Science degree in Forestry and Wildlife Management from Mississippi State University, Starkville, Mississippi in May, 1990; received a Bachelor of Science degree in Psychology from Oklahoma State University, Stillwater, Oklahoma in May, 1996. Completed the requirements for the Master of Science degree with a major in Clinical Psychology at Oklahoma State University in May, 2000.

Experience: Research assistant in the Department of Psychology at Oklahoma State University for Susan Orsillo, Ph.D. and John Chaney, Ph.D., 1997-1999 and 1999-present, respectively; employed by Oklahoma State University, Department of Psychology as a teaching assistant, Oklahoma State University, Department of Psychology, 1997-1999; Student Director of the Psychological Services Center in the Department of Psychology at Oklahoma State University, 1999 to present.

Professional Memberships: American Psychological Association, Association for the Advancement of Behavior Therapy, Southwestern Psychological Association, Oklahoma Psychological Association.