The Relation Between Daily Stress and Health.

Glenn Neil Jones

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The relation between daily stress and health

Jones, Glenn Neil, Ph.D.
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THE RELATION BETWEEN DAILY STRESS
AND HEALTH

A Dissertation
Submitted to the Graduate Faculty of
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in
The Department of Psychology

by
Glenn Neil Jones
B.S., University of Houston, 1980
M.A., Louisiana State University, 1984
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Abstract

The role of stress in the development and exacerbation of physical symptoms has long been a topic of interest. The present investigation attempted to establish if there is an association between the irritants and demands of everyday life -- termed minor stressors -- and health. In order to investigate the influence of minor stressors on health, it appears necessary (for a number of reasons discussed in the text) to account for the influence of major life events on health and on minor stressors. Both major and minor stressful events were assessed using two approaches: simple frequency counts, and a subjective weighting approach which attempts account for the individual's perception of the stress of the events.

One hundred eighty four subjects from the community volunteered to participate in the project. They completed the daily stress measure for seven days. At the end of this week they completed an inventory of major stressors, and an inventory of minor physical symptoms. The data were analyzed using multiple regression and path analytic techniques.

The results of both measurement approaches yielded similar relations among major life events, minor
stressors, and health. Further, the use of the subjectively weighted measurement approach did not add significantly to the association between stress and health. It is argued that there is little empirical support for, and a number of conceptual arguments against the use of such subjectively weighted measurement approaches.

The results revealed an association between major life events and minor stressful events, giving some support to the argument that minor stressful events should be investigated in the context of major stressful events. Higher levels of both major and minor stressful events were associated with increasing numbers of physical symptoms. Further, minor stressful events were associated with physical symptoms even when the influence of major stressful events was controlled statistically. Although the results are not inconsistent with a causal model, the threats to causal interpretations are discussed. It is concluded that the role of minor stressful events in causing or increasing disorders is worthy of further empirical investigation.
Introduction

The hypothesis that stress contributes to or causes illness has a long history. One of the early landmarks in the study of stress and illness was Selye's (1956) laboratory explorations of the General Adaptation Syndrome suggesting that continuing adaptation to stress could result in serious effects on the body's resistance to disease. Measures of stress were developed to investigate the influence of naturally occurring stress on illness. Findings from numerous studies indicate that a modest, but significant positive relation exists between major life events and the onset or occurrence of many medical and psychological disorders (see Dohrenwend and Dohrenwend, 1978, 1981; and Rabkin and Struening, 1976 for reviews). Most authorities agree that life-event measures, as they exist, provide evidence for a stress-disorder relation. However, the strength and nature of the relation remains obscure (e.g. Dohrenwend & Dohrenwend, 1978; Rabkin and Struening, 1976; Perkins, 1982).

In the late 1970's and early 1980's there have been a number of critical reviews of the literature concerning stress and illness. Three major themes have
emerged. The first theme concerns moderators that either exaggerate or lessen the impact of stressful events. Suggested moderators include characteristics of the individual, such as 'hardiness' (cf. Kobasa, 1979; Kobasa, Maddi & Courington, 1981) and coping skills (Lazarus, 1981), as well as characteristics of the individual's environment, such as social support systems (Cobb, 1976; Pearlin, 1982). A second theme concerns the measurement of stress. A number of suggestions have been made for improving the measurement of stress. These suggestions involve various ways of including characteristics of the events (such as their desirability) in assessing stress and stressful events. This search for better measures of stress has lead to a re-examination of the concept of stress. The third theme also concerns the conceptualization of stress. A number of investigators have suggested that in addition to major life events, everyday events and annoyances, termed "hassles" or minor stressful events, may have their own stressful impact, and may be important influences on health. This paper will present the examinations of the concept of stress. The current debates about the conceptualization and assessment of life events will be presented first as background for how everyday events or "hassles" should be
conceptualized and investigated. Issues in the assessment of health will then be presented, and finally the literature and evidence concerning the relation between minor stressful events and health will be examined.

Examinations of the Concept of Stress

Most stress researchers conceptualize stress as either (1) a response of the individual to some event, or (2) the event or stimulus itself, generally termed the stressor. The former are called response theorists, and the latter stimulus theorists (Derogotis, 1982). For the response theorists, the emotional and physical reactions define the presence of stress. Selye established the response theorist position when he defined stress in terms of the occurrence of the General Adaptation Syndrome. For him, stress is the common changes that occur in the body as a result of any demand upon it (Selye, 1982). Selye delimited three phases - the alarm phase, the resistance phase, and the phase of exhaustion, all of which were defined by physiological changes (e.g. the adrenal enlargement, gastrointestinal ulcers, and thymicolympmatic shrinkage of the alarm phase). For Selye, the physiological
reactions of the organism were the defining elements of stress.

Stimulus theorists focus on the aspects of the environment that are stressful, demanding, or disorganizing. Stimulus theorists argue that the important question is how naturally occurring events (stressors) cause or contribute to the development of symptoms and disorders (Dohrenwend and Dohrenwend, 1974). These theorists point out that response approaches to stress run the risk of circularity; that is, stress responses are used to predict themselves.

Holmes and Rahe established the stimulus theorist approach. They conceptualized stress as change. They argued that events which cause change in daily routine or lifestyle require adaptation, and as Selye's work had suggested, severe or prolonged periods of adaptation may predispose the development of illness (cf. Rahe and Arthur, 1978). This reasoning was made operational in the Schedule of Recent Events (SRE). The SRE is an inventory comprised of 43 items. These items were taken from the systematic study of the events preceding illness in a large number of patients (Holmes and Masuda, 1974). These events came to be known as "life events". They range from the rare and traumatic (e.g. death of spouse), to the annual and commonplace (e.g.
Christmas), and to some which may be considered positive (e.g. birth of a child). The common component was that each of the events involved some alteration of daily routine or of lifestyle. For the SRE, the amount of stress was quantified by counting the number of life events occurring during a particular time period. Subsequently, Holmes and Rahe decided that different amounts of change may be involved in the different events. They had a sample of judges rate the events in terms of the amount of readjustment and change involved. These ratings were incorporated as "weights" for each of the items in the subsequent Social Readjustment Rating Scale (SRRS). The items were assigned weightings, known as Life Change Units, which were the amount of change involved in the event. When summed together, the total of the Life Change Units formed the score for the SRRS, indicating the total amount of stress experienced.

The SRRS and SRE have been criticized on a number of points. Many investigators have begun to question whether all changes are detrimental. Various ways to distinguish between life events that have more or less impact on an individual's health have been proposed. Important characteristics of the events may include how well the event can be anticipated or controlled (cf. Brown, 1974; Dohrenwend & Dohrenwend, 1974; McFarlane,
Norman, Streiner, Roy, & Scott, 1980) or how novel the event is (Rabkin and Struening, 1976). The distinction receiving the most attention has been between desirable and undesirable events. It has been proposed that the undesirable events and changes account for the detrimental effects of changes in living circumstance (Brown, 1974; Mechanic, 1975; Sarason, de Monchaux and Hunt, 1975). While there has been no empirical resolution to this debate, the evidence has tended to support the conclusion that the undesirable life events (often termed negative) account for the association between life events and the development of disorder (cf. Dohrenwend & Dohrenwend, 1981; Ross and Mirowsky, 1979; Tausig, 1982; Vinokur and Selzer, 1975).

An issue that cuts across the 'desirability' issue concerns the individualized assessment versus the normative assessment of the impact, desirability or change involved in a particular event. The essential question concerns who decides whether an event is undesirable or involves change, and who decides how undesirable an event is, or how much change an event involves. Holmes and Rahe (1967) established a normative approach. Their weighting scheme was derived from averages of estimates of the change involved in the events. Their weights reflect the change an average
person would be expected to experience for a given event. A number of investigators have suggested an idiographic approach to weighting the events, that is asking the individual to provide the weightings (e.g. Breznitz, 1980; Caplan, 1975; Chiriboga, 1977; Hinkle, 1974; Rahe, 1974; Theorell, 1974; Vinokur & Selzer, 1975). These investigators argue that the impact, desirability, amount of change, and other characteristics of an event depend upon each individual's particular life situation.

Lazarus and colleagues (Folkman & Lazarus, 1984; Holroyd & Lazarus, 1982; Lazarus & Folkman, 1984b; Lazarus, Kanner, & Folkman, 1980; Lazarus & Launier, 1978) have formalized this stance in their interactive model of stress. Lazarus and colleagues posit that stress cannot be conceptualized as purely a quality of the events. An individual must perceive the event and evaluate the event as having implications of threat, harm or loss before the individual responds to the event. This process of evaluation is thought to be a product of the individual's current life situation, plus stable factors such as past experience, attitudes, and personality features. To Lazarus and colleagues, stress exists only in the interaction of the environmental
stimulus with the individual's subjective evaluation of the stimulus.

The primary criticisms of Lazarus and colleagues' interactive model has come from stimulus oriented theorists such as Dohrenwend and colleagues (Dohrenwend, Dohrenwend, Dodson and Shrout, 1984; Dohrenwend & Shrout, 1985). These stimulus theorists argue that the interactive model, especially as it is made operational in measures of stress, risks circularity. The interactive model posits that stress exists only in the appraisal of an event as threatening. Dohrenwend and colleagues argue that using the appraisal of an event (as threatening or distressing) to assess stress risks confounding stress and psychological symptoms. Dohrenwend & Shrout (1985) illustrate their objections by examining the Daily Hassles Scale (Hassles Scale) created by Lazarus and colleagues (DeLongis, Coyne, Dakof, Folkman, & Lazarus 1982; Kanner, Coyne, Schaefer & Lazarus, 1981). The Hassles Scale is a 117 item self-report inventory designed to measure the minor undesirable events that occur frequently in a person's life. Respondents are given a list of ways in which people can "feel hassled". They are asked to indicate which of the "hassles" happened in the past month, and how severe each was on a 3 point Likert scale ranging
from 1 (somewhat severe) to 3 (extremely severe). Dohrenwend & Shrout (1985) argue that the scale forces the respondent to evaluate all of the items in terms of subjective distress. In marking an item the respondent is indicating that it was a hassle. There is no opportunity to indicate that an event occurred but was not a hassle or caused no distress. Persons who indicate that events caused them to feel threatened or "hassled" are essentially stating that they experienced distress following the event. Further, these people are indicating that they are having problems coping, another confound, because poor coping skills may also leave people at risk for psychological distress. Dohrenwend and colleagues argue that this approach is circular because distress is used both to define stress, and as an outcome of stress. Symptoms are used to predict symptoms, and the role of the events in the subjects' lives is lost.

Dohrenwend and Shrout (1985) propose that a rapprochement is possible. The essence of their argument is that the various proposed components of the interactive model must be measured separately from each other, and from the stress responses and symptoms they are to predict. The questions and operations that measure one construct cannot be the same as those that
measure another construct. Only with separate, unconfounded, measures can investigations be made of the influences and interactions of each of the proposed components of the stress process on the other components, and on disorder. Thus, measures of life events should assess what events occurred as objectively as possible. The appraisal process can then be investigated as a mediator between the events and the stress responses and the development of symptoms.

While Dohrenwend and Shrout (1985) focused on one measure and the attempt to operationalize Lazarus' interactive model, they have also indicted subjective weighting schemes in general (Dohrenwend, Krasnoff, Askenasy, and Dohrenwend, 1982). Asking an individual to rate the undesirability, aversiveness or even "stressfulness" of an event appears similar to asking the individual to rate how distressed he was by the event. There may not be a distinction between how undesirable or stressful an event was, and how much distress the event elicited to the average person who is doing the rating. The desirability or impact of an event will vary not only with life circumstance, but also as a function of psychopathology, available coping resources and coping skills. Thus, subjective weighting
schemes to some degree run the risk of circularity; i.e. using distress to predict distress.

All of the debate about subjective versus objective approaches tends to pale when the data are considered. In terms of the operations involved, the debate concerns the potential superiority of a particular weighting scheme. The data have often failed to show that any weighting scheme is superior to any other, although most of the comparisons have been conducted within the normative approach to weightings (Gersten, Langner, Eisenberg, & Orzech, 1974; Lei and Skinner, 1980; Rahe, 1974; Ross and Mirowsky, 1979; Skinner and Lei, 1980). Further, weighting schemes often are not significantly better than the simple count of the frequency of events. Given the parsimony of simple frequency counts, it has been suggested that frequency counts be routinely used to check on the utility of proposed weighting schemes (cf. Cleary, 1980; Lorimor, Justice, McBee, Weinman, 1979). The vast majority of investigations of subjective weighting schemes have failed to contrast their results with simple frequency counts or to test the two measurement approaches against each other statistically (cf. DeLongis, et al., 1982; Kanner et al. 1981; Lundberg, Theorell & Lind, 1975; Rubin, Gunderson, Arthur, 1969; Rubin, Gunderson, &
Authur, 1971). In one of the few investigations available that directly compared normative and subjective approaches, Tausig (1982) found no differences between the abilities of the two approaches to predict depression. Given the magnitude of the theoretical debate, the paucity of relevant investigations is surprising.

The debates concerning the importance of change versus desirability, and the importance of subjective versus objective weightings have led to changes in the measurement of life stress. Many events in the SRRS might be considered desirable in some circumstances, and undesirable in others (cf. birth of child). Further, some SRRS items are vaguely worded so that both desirable and undesirable events might be represented by the same item. For example, a change in employment could be undesirable (such as being fired) or desirable (such as being promoted). Approaches to measuring life stress that attempt to rectify these problems have emerged. One excellent example of this is the Life Experiences Survey (LES) (Sarason, Johnson, and Seigel, 1978). In the LES many of the items of the SRRS are reworded to reduce the vagueness of the events described. For example, change in employment has been expanded to two items: being fired and taking a new
job. Further, the respondent is allowed to indicate the desirability of the event, and to rate the impact of the event. Scores can, therefore, be derived from the subjective weightings of the events as well as from normatively based approach. Therefore the LES allows for the direct comparison of subjectively weighted scores and frequency counts.

**Minor Stressors**

Lazarus, Kanner, DeLongis and colleagues proposed that stress may not only be the major events in people's lives, but that day-to-day events may also play a significant role in the stress-disorder relation (cf. DeLongis, et al., 1982; Kanner, et al., 1981; Lazarus, 1984; Lazarus & DeLongis, 1983; Lazarus, DeLongis, Folkman, & Gruen, 1985). Minor stressful events are conceptualized as the frequent, low intensity stresses of everyday life. They are the irritations, "hassles", problems, and frustrations that can occur daily. They are distinguished from major life events in two ways. First, minor stressors can occur frequently and many may occur even in a single day. In comparison major life events are rare, some may occur only once in a lifetime. Second, minor events are conceptualized as having less severe negative impacts than major life events, which
can approach the catastrophic (e.g. death of spouse). Examples of minor stressors include arguments, congested traffic, and inclement weather. Most investigators have argued that rather than replacing the study of major life events, both minor stressors and major life events may play a role in the stress-disorder relation (cf. Brantley, Waggoner, Jones, & Rappaport, 1987; DeLongis, et al., 1982; Kanner, et al., 1981).

Measurement of Minor Stress

To date, only a few studies have attempted to examine the wide range of minor stressors that might occur in everyday living. DeLongis, et al. (1982) suggest that Cason (1930) may have been the first to study minor stressors in his description of "common annoyances," but there was no further development of this approach. More recently, Lewinsohn and Talkington (1979) investigated the influence of pleasant and unpleasant events on affect. Although they were interested in the effects of punishment and reinforcement schedules on depression, their unpleasant events appear conceptually related to minor stressors.

Kanner et al. (1981) appear to have been the first to develop a broad band measure of naturally occurring daily stress. Their Daily Hassles Scale (Hassles Scale)
is a 117-item self-report inventory designed to measure the "hassles" a person has experienced over the past month. The items were generated by the investigators to cover a variety of sources of "hassles" in everyday life. The scale is administered once a month. Respondents are given a list of ways in which people can "feel hassled". They are asked to indicate which of the "hassles" happened in the past month, and how severe each of the "hassles" was. Each item is rated on a 3 point Likert scale ranging from 1 (somewhat severe) to 3 (extremely severe). Preliminary norms based on 100 middle aged and older adults are presented by Kanner et al. (1981). As pointed out above, the scale has been criticized for the confounding of the occurrence of events and the distress involved in those events. As Dohrenwend and Shrout (1985) point out, there is no opportunity to indicate that an event occurred but was not a hassle.

At about the same time, and independently, Brantley and colleagues were developing the Daily Stress Inventory (DSI), presented in Appendix B. The DSI (Brantley, Waggoner, Jones, & Rappaport, 1987) is a 58-item self-report inventory that allows a person to indicate what they have experienced in the past 24 hours. While the Hassles Scale was designed to be
administered on a monthly basis, the DSI was designed to be administered on a daily basis. In other words, the DSI was designed to measure daily fluctuations in stress. The items were generated in a behavior analytic fashion, i.e., items were derived from daily logs kept by adults of the daily events that they considered stressful. Items were selected on the basis of their relatively frequent occurrence, which was confirmed in pilot studies. Respondents are asked to complete the scale at about the same time every evening, preferably before retiring. Respondents are asked to indicate which of the listed events occurred, and then to rate the stress of each event. A Likert type scale is provided ranging from 1 ("occurred but was not stressful") to 7 ("caused me to panic"). The DSI was developed, and then standardized with large samples of community adults. Norms for a single day appropriate for community adults are available (Brantley et al., 1987). Three scores are derived from the DSI for each 24 hour period of monitoring. The number of events that occurred forms the Frequency score. The sum of the subjectively weighted stress of the events forms the Sum score. The Sum score reflects the total subjective stressful impacts of the events of the preceding day. Finally, the average impact of the events forms the
third score (average impact rating). This last score is fashioned after the Intensity score of the Hassles Scale, which Kanner et al. suggest is the average distress experienced regardless of the number of items ("hassles") endorsed.

The DSI has performed well in validity studies. The DSI has concurrent validity with the Hassles Scale when both are used to assess the same month of minor stressors. On a daily level, the DSI is concurrent with daily subjective ratings of stress. The scale has demonstrated construct validity in that it correlates with daily state anxiety (Brantley et al., 1987). The DSI also has demonstrated convergence with endocrine measures of stress. High daily stress was associated with elevated levels of urinary Vanilmandelic Acid (VMA) -- an indicator of epinephrine and norepinephrine levels -- and cortisol (Brantley, Deitz, McKnight, Tulley, & Jones, 1987).

Major and Minor Stressors

Minor stressors and major life events may be related to each other in a number of ways. One possibility is that minor events serve as mediators between major life events and disorder. Major life events may cause some minor life events, leading to
disorder. A particular major life event may cause a particular pattern of minor events. For example, changing jobs involves multiple minor "hassles", such as having to learn new routines, having to deal with new people, etc. Taken to its extreme, this model suggests that a thorough inventory of major life events should allow one to predict certain minor stressors in a person's life.

However, the extreme form of this model does not appear likely for three reasons. First, even if a particular pattern of minor stressors could be said to be caused by a particular life event for a particular individual, it does not appear likely that similar life events will result in similar patterns of minor events for other individuals. That is, any given change in residence may not equal any other change in residence. Moving within the same city does not appear to be as stressful as moving to a new city, and two people making similar moves within the same city will probably experience different "hassles" depending upon other factors such as their financial status. Second, it seems almost certain that there is a large class of minor stressors which are not predictable from major life events, such as bad weather and car problems. Finally, it also seems likely that minor stressors may
have an influence on the impact of a major life event, and a recent major life event may influence the impact of subsequent minor events. A person who is attempting to deal with a situation involving multiple and repeated minor stressors (e.g., undertaking a course of study in graduate school) will probably be more impacted by a major life event than a similar person who has settled into a less demanding life situation. A flat tire will probably be more stressful to a person who has just experienced the unexpected death of her or his spouse than the average person. There appear to be three conclusions. First, it seems that any model of major and minor life events should deal with both sources of stress as unique. Second, not only the additive, but also the interactive aspects deserve further exploration. Third, assessment of both major and minor stressors appears to hold the promise of yielding a more thorough picture than either approach alone.

Assessment of Health

Before turning to the topic of the relation between minor stress and health, it seems necessary to discuss the conceptualization and assessment of health. Health has been defined and assessed in a number of ways. Despite the importance of health to areas like
behavioral medicine, no particular approach to the assessment of health appears superior (Brantley and Bruce, 1986). The principal approaches to assessing health are primarily based on physical impairment and the behaviors that accompany illness. This logic defines health as the absence of illness, impairment or symptoms. That is, health is defined negatively by saying what it is not. While health would seem to be more than the absence of illness, no acceptable measures which take a positive approach to defining health are available (Brantley & Bruce, 1986).

Direct assessment of illness, especially in the form of medical examinations, often serves as the standard against which other assessment techniques are gauged. While the medical examination is considered highly objective, especially when combined with laboratory data, practical considerations such as cost severely limit its use in health research. The vast majority of approaches to assessing health are based on the behaviors which accompany illness, such as seeking medical attention, reporting symptoms, and functional limitations. These measures of health are often derived from two sources: archives and self-report.

Archival Measures. Illness measures have been derived from the medical records and absenteeism records
of samples of convenience. This approach assesses the illness behaviors of seeking medical attention, functional limitations in the form of interference with occupational duties, and may also access physician assessments of illness. An excellent example of this approach is Thurlow's work (1971). To assess health Thurlow examined a company's health records for the number of illness episodes, number of different illnesses, and absenteeism due to illness. While indices of health drawn from medical records, physician ratings, and related methods are considered to be quite objective, a number of problems have been pointed out. It has been suggested that medical records, clinical physician interviews and notes, and medical utilization are influenced by characteristics of the individuals. People may vary in their tendency to decide that they are ill, to seek medical attention, to present physical symptoms to a physician, and to adopt the "sick role". This individual variation has been denoted as "sick-role tendency" and the tendency to engage in "illness behavior" (Mechanic, 1976, 1978; Thurlow, 1971). A related consideration is that these records tend to be heavily biased toward documentation of serious illnesses. That is, serious illnesses are more likely to be documented in medical and company records than are
minor illnesses. The latter are less likely to be brought to the attention of a physician or to lead to absenteeism than the former. The second major problem is a pragmatic consideration. Gaining access to medical and company records can be quite difficult, and can also involve ethical problems.

**Self-Report Measures.** By far the most common assessment techniques are the self-report measures of health. A wide variety of self-report approaches have appeared in the literature. Included in this category are the subjective ratings of health or sense of well being, self-monitoring of specific symptoms, and the self-report inventories. However, the vast majority of these techniques have been poorly described, and often are presented without reliability or validity data (Brantley and Bruce, 1986). Among the self-report measures, the best researched are the symptom checklists, such as the Seriousness of Illness Rating Scale (SIRS) (Wyler, Masuda & Holmes, 1968), the Health Status Questionnaire (HSQ) (Meltzer & Hockstim, 1970) and the Wahler Physical Symptom Inventory (WPSI) (Wahler, 1983).

The SIRS is a list of 126 physical and mental symptoms and diseases. Each illness is weighted according to its "seriousness", i.e. threat to life,
prognosis, and degree of disability. One interesting aspect to this scale is the inclusion of diagnostic categories, such as peptic ulcer and leukemia. It would seem that the use of diagnostic categories would require a relatively high degree of medical sophistication on the part of the respondents. For the general population, one has to wonder if responses to such items reflect self diagnosis, or the respondents understanding of a medical work-up. These types of items allow for the potential confusion of symptoms and syndromes (e.g. stomach pain with peptic ulcer) and for the confusion of different syndromes with each other (e.g. leukemia with sickle cell disease). Despite this apparent drawback, the scale has been found to be reliable, and to have concurrent validity with subjective ratings of health (Garrity, Marx, & Somes, 1978), as well as convergent validity with indices of health derived from medical records (Kobasa et al., 1981).

The HSQ assesses not only illness in the form of a wide variety of chronic conditions and physical symptoms, but functional limitations in the areas of working and self-care as well. This approach has the advantages of assessing both physical symptoms and how these symptoms interfere with daily activities. The HSQ also shares the problematic feature of including
diagnostic categories. As noted above this emphasis on diagnostic categories raises questions about the applicability of the scale to a general population as well as potentially biasing the scale toward defining health in terms of serious illness. The scale has been found to be reliable and to have convergent validity with medical records (Meltzer & Hockstim, 1970).

The WPSI is a checklist of a wide variety of physical symptoms. It is unique in a number of respects. First, the WPSI was designed to assess body sensations and symptoms, rather than diagnostic categories. This reduces the level of sophistication required of the respondents and increases certainty about what the respondents are reporting. Further, the focus on body sensations and symptoms reduces the bias toward defining health in terms of serious illness (a point which will be further pursued below). The second unique feature of the WPSI is that it was designed to assess somatic complaints. Symptoms of psychological distress, affect, and dysphoria were not included. This allows for the separation of somatic symptoms and psychological symptoms, as different models may be applicable to the study of each. The WPSI has been found to have high internal consistency and reliability. The scale has been shown to discriminate between samples
known to differ in health status (e.g. college population and rehabilitation patients) (Wahler, 1983). The scale also has been demonstrated to have concurrent validity with subjective self ratings of health and functional status, as well as convergent validity with physician ratings of health, staff ratings of functional status, and medical records of illness in a sample of patients on dialysis (Bruce, 1986; Bruce, Brantley, Cocke, & McKnight, 1986).

Rahe, Holmes, and colleagues emphasized the occurrence of serious illness in their early work (cf. Rahe, 1974). Their focus was on the occurrence of physical illness among enlisted personnel which was serious enough to warrant medical attention or to interfere with duties. This emphasis on the occurrence of serious illness has been continued into present attempts to measure physical health. The emphasis on serious illness presents certain problems. By assessing health in terms of serious illness occurrence, these investigators implicitly accept DeLongis, et al.'s (1982) argument that health is a stable phenomenon, a long-term outcome. This approach emphasizes the stable, long term model of health as a 'trait variable'. Brantley, et al. (1987) point out that different models may be necessary for different types of somatic
disorders. For catastrophic illnesses, and especially the onset of illnesses, the trait approach may be appropriate. However, with many illnesses, and especially chronic conditions and common milder illnesses (e.g. colds and flu), symptoms fluctuate comparatively rapidly. The symptoms of many illnesses fluctuate from week to week, and even from day to day. For many of these illnesses, these fluctuations are thought to be related to stress. The list of such illnesses ranges from asthma (cf. Goreczny, Brantley, Buss & Waters, 1986) to headache (cf. Waggoner, 1986) to skin disorders (cf. Faulstich, Williamson, Duchmann, Conerly, & Brantley, 1985). It would seem that there is a lot of variability in health which is lost by emphasizing counts of the onset of serious illnesses. An assessment instrument which focuses on a wide range of physical symptoms may allow for investigating the influences leading to fluctuations in health.

**Minor Stressors and Health**

DeLongis, et al. (1982) conducted an extensive review revealing that until recently, only a few investigators have studied minor stressors. Most investigators have focused on a particular stressor, such as noise (Glass and Singer, 1972), rush hour
traffic (Novaco, Stokols, Campbell, & Stokols, 1979), sex role conflicts (Pearlin, 1975), and work load (Frankenhaeuser & Gardell, 1976). Brantley, et al. (1987) point out that there is a large body of literature which suggests that particular minor stressors can influence psychological and physiological states. Numerous studies of experimentally induced affective states have used procedures which can be reconceptualized as minor stressors (cf. Bakel & Kaganov, 1977; Barker, Dembo & Lewin, 1941; Zuckerman & Lubin, 1965; Zuckerman, Lubin, Vogel, & Valerius, 1964). Similarly, many "laboratory stressors" which appear similar to minor stressors (e.g. arithmetic tasks, mental imagery, and loud noises) produce a variety of physiological responses. Further, evidence that minor stressors may influence health related physiological parameters has also been obtained in more naturalistic studies. Occupational situations involving a repeated minor stressor have been related to elevated blood pressures (Mustacchi, 1977; Cobb & Rose, 1973). Stressful conversational topics may alter physiological parameters relevant to the control of diabetes (Hinkle and Wolf, 1952). Serum cholesterol levels (a coronary risk factor) have been related to minor stressors (e.g. van Doornen and Orlebeke, 1982). These investigations
suggest that minor stressors can influence affective and physiological states, which may have health related consequences. However the vast majority of these investigations have focused on single minor stressors or single stressful situations, and on single response variables.

To date, only a few studies have attempted to examine the wide range of minor stressors that might occur in everyday living and relate these to health. As noted above, Cason (1930) may have been the first to study minor stressors in his description of "common annoyances," but there was no attempt to relate these common annoyances to health. More recently, Lewinsohn and Talkington (1979) investigated the influence of the occurrence of pleasant and unpleasant events on affect. They found that depression was moderately related to the frequency and subjective aversiveness of unpleasant events. Their unpleasant events appear conceptually related to minor stressors.

Using their Hassles Scale, Kanner, et al. (1981) appear to be the first to make a systematic investigation of the broad band of minor stressful events and to relate these to major life events and disorder. They present data about the inter-relations of major life events and minor stressors. They found
that minor stressors were not highly related to major life events. Their data supports the conceptualization of daily events as unique from life events, that is, as a separate source of stress. Further, they found that minor stressors were more related to psychological symptoms than were the major life events, but the combination of minor stressors and major life events was the best predictor of disorder. DeLongis, et al. (1982), using the same sample, found a similar pattern of results in their study of major life events, "hassles", and health indices. DeLongis, et al. (1982) emphasized the model that a stable pattern of stress is required to have an impact on health. In their investigation, they averaged across two and a half years of life events data and nine months of minor stressor data in order to obtain stable estimates of major and minor stress. They then used these global scores to predict health indices which emphasized the presence or absence of major serious illnesses, and which treated health as a stable characteristic of the individuals. DeLongis et al.'s results suggest that high averages of daily stress and major life events are associated with serious disease and health problems.

DeLongis et al.'s (1982) approach does not allow one to investigate the relation between fluctuations of
stress and fluctuations of health. Brantley, et al. (1987) hypothesized that the relatively rapid fluctuations in minor illness and physical symptoms may be related to the "hassles" and minor stressors that occur in everyday life. Minor stressors appear to be particularly promising in studying the rapid fluctuations in health. First, conceptually, the level of minor stressors can also vary rapidly, from day to day or week to week. Minor stressors may also occur in close temporal proximity to the onset, exacerbation or recurrence of physical symptoms. Finally as pointed out above, minor stressors (in the form of laboratory stressors) have been shown to influence a variety of physiological functions which may have health implications. Thus, for exacerbation of the symptoms of chronic conditions and the onset of relatively minor illnesses, a state approach to both symptoms and stress seems to be a promising model.

Two recent investigations lend some support to this formulation. Waggoner, in his dissertation (1986) studied the relations among stress and headache measures. Waggoner had his subjects complete the DSI and a headache log concurrently for a month. He found that indices of minor stress for the month were related to the various parameters of headache activity, while
the life events of the preceding year were, for the most part, unrelated to the headache measures of that month. His data suggested that the temporally proximal minor stress was more related to problems with headaches than the stable "background" level of major stress.

Goreczny, Brantley, Buss, & Waters (1986) investigated the role of daily stress in exacerbations of asthma symptoms in asthmatics and Chronic Obstructive Pulmonary Disease (COPD) patients. Goreczny et al. found that on high stress days both patient groups experienced more severe breathing problems than on low stress days. For these disorders, exacerbations appear to be related to fluctuations in minor stress levels. Investigations like these are critical for delineating the role of stressors in the exacerbation of particular diseases. However, both of these studies suffer from similar drawbacks. One limitation is the restriction of the variability in "health" involved in focusing on the symptoms of a single chronic disease. The health of headache patients probably consists of more than problems with headaches. Targeting a single illness for investigation ignores the wide variety of other minor illnesses that may occur, such as occasional gastro-intestinal distress, or colds, or flu. Similarly, asthma patient may have problems with asthma,
as well as headaches, colds, etc. There are two points to be made. First, health probably consists of more than the symptoms of a single chronic disease or condition. Second, limiting health to the symptoms of a single chronic disease may also limit the obtained strength of the general association between stress and health, as it is highly likely that any particular chronic disease patient probably has other symptoms and illnesses from time to time, any or all of which may also be responses to stressors. Thus a great deal of variability in symptoms is lost. On the other hand variability in health is often restricted in another way. For example, Goreczny et al. (1986) limited their study to patients with an identified disease. This restricted the range of asthma symptoms obtained, as all of his subjects experienced relatively severe symptoms. While asthma severity probably forms a continuum, Goreczny et al. (1986) only studied the upper end of the continuum. Restricting the range of health outcome variables will probably yield underestimates of the relation of stress and health. In summary, there would appear to be a number of advantages to assessing a broad band of symptoms in relating stress to health.
The Present Study

The present investigation is designed to further explore the relation between minor stress and health. Health will be conceptualized as the occurrence of minor physical symptoms. The assessment of minor symptoms should provide a great deal of variability and sensitivity in the outcome measure of health. Community adults will be studied to obtain as wide a range of physical symptoms as possible. Further, subjects will be assessed over a short period of time, and health will be treated as a state variable. This investigation will attempt to address the criticisms of the stimulus theorists and demonstrate that number of minor stressful events are related to health, even without subjective weighting of the events in terms of distress. Further, current minor stressful events, past major stressful events, and the combination will be compared in terms of their ability to predict current health. This will involve exploring the relation between major life events and minor stressors, and then the relations among these constructs and health. Finally, this investigation will attempt to add empirical fuel to the debate between Lazarus and colleagues and Dohrenwend and colleagues. Put simply, the question is whether or not the subjective weightings of the impact of stressful events
add significantly to the ability to predict health when compared to knowledge of the simple occurrence of stressful events. While the magnitude of Kanner, et al.'s (1981) and DeLongis, et al.'s (1982) obtained associations between subjectively weighted stress scores and psychological and physical disorders appears impressive in terms of stress research, they did not (and Dohrenwend and Shrout (1985) would argue could not with their scale) contrast their results directly with the parallel model of unweighted scores. This investigation will obtain both counts of the number of events, and subjective ratings of the impact of the events. This will allow the direct test of whether or not the subjective weighting approach adds substantially to the ability to predict health.

Hypotheses
1. **Major and Minor Stress.** It is hypothesized that minor stress will be significantly correlated with major stress, but that this correlation will be of a modest magnitude (e.g., $r = .15$ to $.40$). As detailed in the literature review, it appears reasonable to expect that the occurrence of some minor stressors may be predictable from the occurrence of particular major stressors. However, the relation should be far from
unitary given the large number of minor stressors that could occur randomly with respect to major stressors. This rationale would appear to hold for both the weighted and unweighted models. Further, as cited above, obtained correlations between major and minor stressors have been modest, but significant.

2. Stress and Physical Symptoms.

2.A. It is hypothesized that both major stress and minor stress will be significantly related to physical symptoms. Measures of major stress have consistently been related to measures of health (Rabkin and Struening, 1976), and a similar relation of modest magnitude is expected. Although much more limited, the available data also suggests a relation between minor stress and health.

2.B. It is hypothesized that minor stress will be the more powerful predictor of physical symptoms, primarily due to temporal proximity and theoretical relation to variations in minor physical disorders. Further, this hypothesis is consistent with the limited available data (c.f. DeLongis et al., 1981).

2.C. It is hypothesized that both major and minor stress will contribute uniquely to the prediction of physical symptoms. That is, in regression terms, the use of both predictors will be significantly better than
the use of either predictor alone. This is consistent with the available data (DeLongis et al., 1981), and follows from the conceptualization of major and minor stress as separate contributors to disorder.

2.D. It is hypothesized that the interaction effect of major and minor stress will be significant. That is, the effect of the minor stressors on physical symptoms will change as a function of major stressors (or vice versa). It is hypothesized that the influence of minor stressors on health will be greater in the context of high numbers of major stressors than in the context of low numbers of major stressors. As presented above, this hypothesis appears logical, but there have been no empirical demonstrations.

3. Subjective Weightings vs Frequency Counts.

3.A. The hypotheses detailed above are expected to hold for both the subjective weighting and the frequency count approach to measuring stressors. Both are approaches to measuring the same constructs.

3.B. It is hypothesized that subjective weighting will not yield a stronger relation with physical symptoms than frequency counts when the two measurement approaches are directly compared. In regression terms, once the frequency count scores are entered into the equation, the subjectively weighted scores will not
contribute unique variance to the prediction of physical symptoms. This hypothesis is based on the fact that both are approaches to measuring the same construct, and the general failure to find any weighting scheme that is superior to simple frequency counts.
Method

Subjects

Two hundred thirty three subjects were recruited from the community of Baton Rouge to participate in a "Stress Project". These subjects were recruited by undergraduate research assistants participating for class credit. The assistants were encouraged to recruit subjects who were not family members or close friends. The assistants were encouraged to recruit strangers and people who were from a variety of social backgrounds and economic status for the project. As detailed in the procedure section, steps were taken to increase subject compliance with the procedure. Subjects were informed of their rights as research participants, and in return for their participation each subject received a "stress profile" indicating where he or she was located in the distribution of the various stress measures.

Information on the age, sex, occupational status, and other demographic variables was collected. None of the subjects identified themselves as full-time students. Eleven subjects were lost due to incomplete or missing data. Only 30 black subjects participated in the project. As there were too few black subjects to
investigate any potential effects of race, these subjects were not included in the project. This removed the potential of results confounded by race effects. Two subjects were eliminated as they could not read and the scales were administered orally. Finally, as described in the analyses section (below), six subjects were identified as 'outliers' and eliminated. The final sample therefore consisted of 184 subjects who were white and reported at least partial high school education. Demographic variables for the sample are presented in Table 1. In summary the average subjects were in their 30's, had one or two years of college education, and had incomes of approximately $40,000. The typical subject was also female, as 36% of the sample was male and 64% of the sample was female.

Measures

The Life Experiences Survey (LES). The LES (Sarason, Johnson, & Siegel, 1978) is a measure of major life events. While the LES was patterned after the SRE, a number of improvements were made. First, items were drawn from many sources (including the SRE) in order to adequately sample from the life changes frequently experienced by the general population. Second, the authors of the LES reworded many of the
Table 1

Demographic Characteristics of the Sample

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (M)</strong></td>
<td>32.79</td>
<td>33.89</td>
<td>33.49</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>(11.79)</td>
<td>(13.66)</td>
<td>(12.99)</td>
</tr>
<tr>
<td><strong>Household Income</strong></td>
<td>44,400</td>
<td>42,000</td>
<td>43,000</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>(30,000)</td>
<td>(30,000)</td>
<td>(30,000)</td>
</tr>
<tr>
<td><strong>Education (years)</strong></td>
<td>15.6</td>
<td>14.8</td>
<td>15.1</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>(1.9)</td>
<td>(2.0)</td>
<td>(2.0)</td>
</tr>
<tr>
<td><strong>Sample N</strong></td>
<td>67</td>
<td>117</td>
<td>184</td>
</tr>
</tbody>
</table>
items and provided separate items to increase the specificity of the events described. Third, the LES allows the respondent to distinguish between events which had a positive and negative impact, as well as providing for idiographic weighting of the impact of the event.

The LES is a 47 item self-report measure (the student version includes 10 items specific to a student population. They are not be included here). The questionnaire asks respondents to indicate which of the 47 major stressors occurred during the past year. Respondents indicate the impact of the event on a Likert type scale from -3 ("extremely negative") to +3 ("extremely positive"). A number of scores can be derived from the LES. The scores will consist of 1) a count of the events that occurred during the time period, and 2) the negative impact score - the sum of the weightings of the events which occurred and had a negative impact. The count of events is directly analogous to the Social Readjustment Rating Scale (SRRS) score. The negative impact score from the LES have been found to significantly correlate with state and trait anxiety, depression, academic problems (Sarason et al., 1978), and job satisfaction (Sarason & Johnson, 1979). Reliability of the LES appears satisfactory. For the
negative impact score test-retest reliability yielded satisfactory correlations, $r = .72$ ($p < .01$) and $r = .88$ ($p < .001$). The scale is presented in Appendix A.

The Daily Stress Inventory (DSI). The DSI (Brantley, Waggoner, Jones, and Rappaport, 1987) is a 58 item inventory of minor daily stressful events. The scale is designed to be administered daily, and respondents indicate which of the events occurred during the previous 24 hours. Respondents then rate the stressful impact of each of the events they experienced on a Likert-type scale from 1 ("occurred but was not stressful") to 7 ("caused me to panic"). The scale is presented in Appendix B. The inventory yields three scores: the number of events that occurred (Frequency Score), the total sum of the weightings given the endorsed events (Sum Score), and the average impact of the events. The DSI has a number of desirable features. The items were generated using the behavior analytic method with community adults. The scale was normed and standardized on large samples of community adults. Coefficients of generalizability across time for the scale were modest (in the low 60's), which Brantley et al. point out is consistent with the intention of measuring daily stress as a state variable.
Brantley, et al. (1987) present data suggesting that the scale has concurrent validity with monthly measures of minor stressors, and daily measures of subjective stress. Further, evidence supporting the convergent validity of the DSI with endocrine measures of stress has been produced. High daily stress was associated with elevated urinary Vanmendelic Acid (an indicator of epinephrine and norepinephrine levels) and cortisol (Brantley, Deitz, McKnight, Tulley, & Jones, 1987). The construct validity of the scale has also been investigated. The DSI correlates with daily state anxiety (Brantley, et al., 1987). The divergent validity of the scale has been investigated using a variety of measures. Brantley, et al. (1987) present data that the DSI is not associated with state measures of hostility, and does not appear to be related to this transient mood state. In a similar vein, Brantley and Jones (unpublished) investigated the relation of DSI scores to selected 'response sets'. Thirty volunteers for a research project investigating headaches completed a week of monitoring with the DSI and the Marlow-Crown Social Desirability Scale (Crown and Marlow, 1964). The number of events endorsed on the DSI (Frequency) was unrelated to this index of responding in a socially desirable manner, (r = .10, ns), as were the
individually weighted impacts of the events (Sum) \( (r = .20, \text{ ns}) \). Fifty-two of the subjects completed the DSI for a week and completed the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway and McKinley, 1943). The DSI Frequency Score was unrelated to any of the validity scales from the MMPI (for the L Scale, \( r = .07, \text{ ns} \); F scale: \( r = .27, \text{ ns} \); K Scale: \( r = -.27, \text{ ns} \)). The DSI Sum Score was related to the MMPI F Scale (\( r = .34, p < .05 \)), but not the L Scale (\( r = .20, \text{ ns} \)) nor the K Scale (\( r = -.24, \text{ ns} \)). These results suggest that the DSI scores are not substantially influenced by the tendency to respond in a socially desirable manner. Only the Sum score, which reflects an individual's perception of the impact of the events, appears to be related to a tendency to report a variety of symptoms or negative aspects about one's life.

**Modified Wahler Physical Symptoms Inventory (WPSI)**

The WPSI (Wahler, 1983) is a self-report measure of physical complaints and symptoms. The items were selected to measure only complaints about physical states or sensations and malfunctions of basic somatic systems. In the standard administration, subjects indicate how often, on a Likert-type scale from 0 ("almost never") to 5 ("nearly every day"), they are bothered by a symptom. Wahler's (1983) data suggested
that women reported more symptoms than men, and to reduce this bias he standardized the scores and provided norm tables for each sex. The internal consistency of the test is quite high (KR20s from .88 to .94). The test-retest reliability of the test is quite high ( .94 for a one day delay, .64 for a three month delay). The evidence for the validity of the test was presented above.

The WPSI emphasizes the assessment of a person's usual physical symptoms, thus treating these as a trait variable. For the present study, the emphasis is on the physical symptoms that occurred during the time period under study, treating health as a variable which may fluctuate. No standardized instrument appeared suitable for this task. Therefore the WPSI anchors were reworded to form the Modified WPSI. The Modified WPSI asked "How much did _____ bother you last week, with anchors of 0 ("not at all") to 5 ("extremely"). The inventory was scored by counting the number of symptoms endorsed as 2 or more (that is bothering the person at least little bit the past week). Following WPSI, the scores were standardized separately for men and women. The Modified WPSI is presented in Appendix C.
Procedure

Subjects were recruited by undergraduate research assistants. Subjects were informed as to the nature of the project, and were given an Informed Consent Form to read and sign (see Appendix D). Following this, each subject was given 7 blank copies of the DSI. A DSI was completed at about the same time daily, between dinner and retiring. On the first day, the research assistant was present to explain the DSI and to answer any questions about the instrument. On the third or fourth day the subject received a "telephone prompt" from the research assistant. This telephone prompt consisted of the student asking if there were any questions about the scale, which also served as a gentle reminder to continue completing the scales each evening. A second telephone prompt occurred the fifth or sixth day. This prompt overtly focused on scheduling a time for the completion of the rest of the scales. On the seventh or eighth day of participation the research assistant provided the subject with a demographic questionnaire, LES and, Modified WPSI, and answered any questions about the scales.

Toward the end of subject collection it became apparent that one research assistant may have been falsifying his data. These nonexistent subjects were of
course deleted. Further, steps were taken to confirm that no other data had been falsified. The principal investigator along with two new research assistants checked the subjects' names, addresses, and telephone numbers with the Telephone Directory and directory assistance. Over 84% of the subjects could be confirmed in this fashion. Further, as many subjects had neglected to provide a telephone number, it was necessary to contact many of them. Over 71% of the subjects were contacted via telephone conversations in which they implicitly confirmed their participation. Only 16% could not be confirmed by either approach, primarily due to the subjects failing to provide telephone numbers and addresses, and a significant number of disconnected phones.
Results

A preliminary inspection of the univariate distributions of the data was performed. Given the large sample size it seemed safe to assume that breaks in the distributions and occurrence of outliers represented problems in the data. Outliers can dramatically influence the coefficients obtained in regression types of analyses, and it has been recommended that substantial outliers be eliminated (Cohen and Cohen, 1983). Subjects whose scores were more than three and a half standard deviations from the mean were identified as outliers. The six subjects who were identified as outliers by this criteria were eliminated from further analyses.

Wahler's (1983) data suggested that there are mean differences in the numbers of physical symptoms reported by men and women. To control for any effect of sex differences on physical symptoms, the Modified WPSI scores were standardized separately for each sex. This essentially removes any differences between the number of physical symptoms reported by the sexes. Unstandardized means of all of the variables are presented in Table 2. All other analyses presented
### Table 2

**Means and Standard Deviations of Stress and Physical Symptom Measures**

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Experiences Survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Events</td>
<td>5.54</td>
<td>(3.77)</td>
</tr>
<tr>
<td>Life Experiences Survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negatively Weighted</td>
<td>-4.54</td>
<td>(4.48)</td>
</tr>
<tr>
<td>Daily Stress Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Events¹</td>
<td>12.13</td>
<td>(6.88)</td>
</tr>
<tr>
<td>Daily Stress Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of Weightings¹</td>
<td>31.17</td>
<td>(21.31)</td>
</tr>
<tr>
<td>Modified Wahler Physical Symptom Inventory²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Males</td>
<td>5.77</td>
<td>(4.93)</td>
</tr>
<tr>
<td>- Females</td>
<td>9.02</td>
<td>(5.39)</td>
</tr>
</tbody>
</table>

¹Daily Stress Inventory scores are reported as average daily scores for the week.

²Modified Wahler Physical Symptom Inventory scores are the number of physical symptoms reported as occurring in the week of the study.
Table 3
Correlation Matrix

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>MLE</th>
<th>MS</th>
<th>NLE</th>
<th>WMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Life Events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor Stressors</td>
<td>.429</td>
<td>.325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Major Life Events</td>
<td>-.261</td>
<td>-.603</td>
<td>-.290</td>
<td></td>
</tr>
<tr>
<td>Weighted Minor Stressors</td>
<td>.479</td>
<td>.359</td>
<td>.911</td>
<td>-.407</td>
</tr>
</tbody>
</table>

Note: N = 184, All correlations are significant, p < .01.
involve the standardized Modified WPSI. The correlations among the variables are reported in Table 3.

The data were analyzed using correlation and regression techniques. Given the large number of statistical analyses and tests conducted, two steps were taken to reduce the experiment-wise error rate. First, the level of significance for each statistical test was set to $p < .01$. Second, in the analyses involving multiple regression, the "full model" was tested for significance before any tests of the significance of the predictors were considered (Cohen and Cohen, 1983).

To facilitate the presentation of the results, the analyses are presented separately for the frequency score method of measurement, and then for the subjectively weighted scores. Then the two measurement approaches are contrasted directly.

**Frequency Counts: Relations between Major Stressors, Minor Stressors, and Physical Symptoms.**

The relation between major and minor stressors was explored using correlations. The correlation between the frequency of major stressors and the frequency of minor stressors was significant $r = .325$, $p < .01$. This correlation indicates that the frequency of major
The relations between the frequency of major stressors, minor stressors, and physical symptoms were also explored using correlations. The frequency of major stressors was significantly related to the number of physical symptoms $r = .247, p < .001$. The frequency of minor stressors was also significantly related to the number of physical symptoms, $r = .429, p < .001$. However, the significant relation between the frequency of major and minor stressors suggests that these correlations should not be interpreted directly.

Regression analyses were performed to determine: 1) the relation between physical symptoms and the combination of major and minor stressors, 2) whether or not minor stressors contributed a significant amount of unique variance (i.e. beyond the variance explained by major stressors) to the prediction of physical symptoms, and 3) whether or not major and minor stressors interacted. The two measures of stressors and their interaction term were entered into a regression equation in a hierarchical fashion. The frequency of major stressors was entered first, then the number of minor stressors, and finally the product of the two (the interaction term). As the question concerns the unique
Table 4

Regression of Frequency Counts of Major Stressors and Minor Stressors Predicting Physical Symptoms

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>F</th>
<th>R</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>35.79</td>
<td>14.69</td>
<td>.444</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>180</td>
<td>146.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>182.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hierarchical SS</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Stressors</td>
<td>11.11</td>
<td>.247</td>
<td>.01</td>
</tr>
<tr>
<td>Minor Stressors</td>
<td>24.68</td>
<td>.369</td>
<td>.01</td>
</tr>
<tr>
<td>Interaction</td>
<td>0.01</td>
<td>.000</td>
<td>ns</td>
</tr>
</tbody>
</table>
variance accounted for by adding variables to the equation, the results are presented in terms of semipartial correlation coefficients ($sr$) for the individual variables. As presented in Table 4 the overall regression was significant, $R = .444$, $p < .001$. Entering first, the number of major stressors accounted for a significant portion of the variance of physical symptoms, $sr = .247$, $p < .01$. Entering second, the number of minor stressors also accounted for a significant portion of the variance of physical symptoms, $sr = .369$, $p < .01$. The interaction of the number of major and minor stressors was not a significant predictor of physical symptoms, $sr = .000$, ns.

Subjectively Weighted Scores: Relations between Major Stress, Minor Stress, and Physical Symptoms.

To facilitate comparison, analyses of the subjectively weighted stressors will be presented in the same manner as were the results of the analyses of the frequency counts of the stressors. As the major life events considered here were negatively weighted by the subjects, the score was negative. Thus negatively signed correlations with major stressors indicate an association with more negatively weighted stressors.
The correlation between the weighted measure of major stressors and the weighted measure of minor stressors was significant, $r = -0.407, p < .01$. This correlation indicated that the two measures shared 16 percent of the variance.

The subjectively weighted scores yielded similar estimates of the relations between major stressors, minor stressors and physical symptoms. The sum of the weighted major life events was significantly related to physical symptoms, $r = -0.261, p < .01$. The sum of the weighted minor events was also significantly related to physical symptoms, $r = 0.479, p < .01$. However, these correlations should be interpreted cautiously because the two measures of stress have a significant amount of variance in common.

The regression for the subjectively weighted scores was performed in the same order as for the frequency counts. As presented in Table 5 the overall regression was significant $R = 0.490, p < .001$. Entering first, the negatively weighted major stressors accounted for a significant portion of the variance in physical symptoms, $sr = -0.261, p < .001$. Entering second, the weighted minor stressors also accounted for a significant portion of the variance in physical symptoms, $sr = 0.407, p < .001$. The interaction of the
Table 5

Regression of Subjectively Weighted Major Stressors and Minor Stressors Predicting Physical Symptoms

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>F</th>
<th>R</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>44.30</td>
<td>19.30</td>
<td>.490</td>
<td>0.001</td>
</tr>
<tr>
<td>Error</td>
<td>180</td>
<td>137.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>182.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hierarchical SS</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Stressors</td>
<td>12.37</td>
<td>-.261</td>
<td>.01</td>
</tr>
<tr>
<td>Minor Stressors</td>
<td>30.27</td>
<td>.407</td>
<td>.001</td>
</tr>
<tr>
<td>Interaction</td>
<td>1.65</td>
<td>.009</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note: Major Stressors were negatively weighted, that is, treated as negative numbers. Thus more stress is associated with a larger negative number.
weighted major and minor stressors was nonsignificant, \( \text{sr} = .009, \text{ns} \). These results are very similar in magnitude to the results obtained with the frequency count approach.

**Frequency Scores contrasted with Weighted Scores**

The two approaches to measuring major and minor stressors yielded very similar patterns of results. To determine if the slightly larger magnitudes of the associations obtained with the weighted scores were significantly different from the coefficients obtained with the frequency counts, the two approaches were contrasted using hierarchical regression (see Table 6). The point of this analysis was to determine whether or not subjective weightings of the impact of the stressful events contributes to the prediction of physical symptoms. First the "full model" of the unweighted number of major stressors and minor stressor scores was entered into the regression, and then the additional variance contributed by the introduction of the subjectively weighted life events and minor stressor scores was tested for significance. The unweighted frequency counts of major and minor stressors (and the interaction) yielded an \( R \) of .444, \( p < .001 \). When the subjectively weighted scores for major and minor
Table 6

R² Improvement of Adding Subjectively Weighted Scores to Frequency Counts in Predicting Physical Symptoms

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F</th>
<th>R</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Counts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>3</td>
<td>35.79</td>
<td>14.69</td>
<td>.444</td>
<td>0.001</td>
</tr>
<tr>
<td>Error</td>
<td>180</td>
<td>146.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>182.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weighted Scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>6</td>
<td>44.98</td>
<td>9.30</td>
<td>.497</td>
<td>0.001</td>
</tr>
<tr>
<td>Error</td>
<td>177</td>
<td>137.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>182.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R² Improvement

<table>
<thead>
<tr>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>.050</td>
<td>3.18</td>
</tr>
</tbody>
</table>
stressors (and the interaction) were entered, the total model $R$ increased, $R = .497, p < .001$. This increase in $R$ was tested using the $F$ test of $R^2$ improvement (Cohen and Cohen, 1983). The improvement in the model was not significant, $R^2$ (improvement) = .050, $F (3,180) = 3.18$, ns.

Path Analysis

As Cohen and Cohen (1983) note, almost all regression studies can be viewed in terms of path analytic models. Path analysis is a set of analytic techniques which has been gaining acceptance in social sciences during the past decade. The techniques are especially appropriate for analyzing non-experimental data and studying patterns of causation among a set of variables. While causality can never be proved using correlational approaches, "weak tests" of causal models are possible. Two phases are involved in a "weak test" of a causal model. First, a causal model must be formulated. This step forces the investigator to explicitly state the theoretical relations among the constructs under scrutiny. The stronger the statements about the expected causal links among the variables, the more powerful the analysis. Once a theoretical statement has been formulated, the analysis reveals if
the data are consistent with the causal model. The absence of predicted relationships can disconfirm the proposed model. If the data are not inconsistent with the model, then the theory has survived this "weak test of the model" (Cohen and Cohen, 1983; Pedhazer, 1982). As the technique is only recently gaining acceptance in psychology, a brief introduction to path analysis is presented in Appendix E.

Having determined that the use of individual subjective weights adds little unique variance to the prediction of minor physical symptoms, the frequency score model will be used in this path analysis. The first step is to present a rational for assigning causal priority to the various variables. As presented in the introduction, it has long been hypothesized that major life events have a causal influence on the occurrence of physical disorders. In path analytic terms, major life events are expected to have a direct effect on physical symptoms. Further, as presented above, it was pointed out that major life events may cause the occurrence of minor stressors. That is, it is hypothesized that there is a direct effect of major life events on minor stressors. Finally, it was hypothesized that minor stressful events may cause physical symptoms. To some extent this may be due to the influence of major life
events. That is, major life events cause minor stressors, which in turn cause physical symptoms. This is termed an indirect effect of major stressors on physical symptoms. However, it was hypothesized that minor stressors would also have a direct effect on physical symptoms, that is, a causal influence not attributable to major life events. In essence, this implies that not all minor stressors can be accounted for by the occurrence of major life events (as theorized above), and that the minor stressors may be a separate source of influence on the occurrence of physical symptoms.

The causal model is succinctly represented in the path diagram presented in Figure 1. The straight lines indicate theorized causal links, and the arrowheads indicate the direction of causality. The path coefficients are the estimates of the direct effect of the variable on the other variables which it is assumed to cause. Table 7 presents a more thorough accounting of the effects of the number of major life events and minor life events on the occurrence of physical symptoms. These coefficients may be interpreted in much the same manner as as standardized beta weights in multiple regression. The total effect of major life events on physical symptoms is .247. The direct effect
of major life events, i.e. the effect of major life events with the effect of minor events controlled, is .125. The indirect effect of major life events, i.e. the portion of the effect of major life events on physical symptoms which is in common with minor stressors events is .124. Minor stressors have a direct effect of .380 on physical symptoms. The spurious component, that is the effect of minor stressors on physical symptoms which is due to both being caused by major life events is .049.
Figure 1
Path Diagram of Life Events, Minor Events, and their Effects on Physical Symptoms.
Table 7  
Path Analysis of the Effects of Life Events and Minor Events on Physical Symptoms

<table>
<thead>
<tr>
<th></th>
<th>Life Events</th>
<th>Minor Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>.125 *</td>
<td>.380 *</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>.124 *</td>
<td>-</td>
</tr>
<tr>
<td>Spurious</td>
<td>-</td>
<td>.049</td>
</tr>
<tr>
<td>Total Effect</td>
<td>.247 *</td>
<td>.380 *</td>
</tr>
</tbody>
</table>

* p < .01
Discussion

The present study was designed to investigate the associations between major life events, minor stressors and health. In the process, this investigation attempted to compare two approaches to assessing stress. In general, the results of the present study are consistent with the hypothesized relations among major stressors, minor stressors, and physical symptoms. Further, both measurement approaches yielded similar patterns of the relations.

Subjective Weighting Schemes

Although there were minor differences between the coefficients obtained with the subjectively weighted scores, and the coefficients obtained with frequency count scores, these differences proved to be statistically nonsignificant. In regression terms, the subjectively weighted major stressors, minor stressors, and their interaction did not add any significant improvement to the unweighted counts of stressors. These results are consistent with the general failure of any weighting schemes to be demonstrably superior to simple frequency counts in terms of predicting health.
From a measurement point of view, the results provide no evidence of the superiority of the subjective weighting approach to assessing the impact of stressors. Further, the present author shares the concerns of the Dohrenwends and their colleagues about potential confounding of stressors with distress that may occur in subjective weighting schemes (Dohrenwend et al. 1984; Dohrenwend et al. 1982). Finally, frequency scores have the advantage of clear interpretation. They reflect simply the number of events that occurred during a specified time. The three factors of lack of empirical support, potential confounds, and clear interpretation provide a strong rationale for the continued use of frequency counts in assessing stress.

The failure of subjectively weighted scoring to improve the association between stress and health warrants some speculation. One question is how these data relate to the interactive model of stress proposed by Lazarus and colleagues. It is hard to argue with their basic stance that the impact of an event on an individual will be influenced by that individual's particular life situation. For example, it seems perfectly reasonable to expect the stress of the birth of a child to differ for married and unmarried people, with number of previous children, and etc. However, it
may not be reasonable to expect people to be able to communicate the impact of the events. There are three points to be made here. First is the problem of the anchors to be used as descriptions of the events. Many of the scales use anchors of "stressful", "negative", and "positive". These descriptions are subject to a wide variety of interpretations. Some thought should be given to developing descriptions that are more specific in their interpretation. A related point is that many of the events can have multiple simultaneous aspects. The death of a long suffering relative can have its positive aspects (their suffering has ended), and its distressing aspects. Perhaps multiple rating scales may be of use in future attempts to develop weights for the events. However, this brings up the final consideration. The subjective weighting assessment approach may be impractical due to the complexity of the techniques. Anecdotally, there were many reports from the research assistants of people having problems understanding how to complete the various scales. In further attempts to develop stress measures, interview techniques may be useful not only to establish validity, but also to systematically investigate the possibility that the rating schemes and items are not clearly understood by the population of interest. These
measurement considerations preclude any definitive conclusions about the underlying interactive model of stress.

**Stress and Physical Symptoms**

The results of the present investigation in general supported the hypothesized relations between major life events, minor life events, and health. First, the results supported the hypothesis of an association between major life events and minor life events. Consistent with the data of Kanner et al. (1981) and DeLongis et al. (1982), this association appears to be far from unitary. The two types of stressors appear to share only about 11 percent of their variance in common. As was pointed out above, it appears unlikely that minor events could be said to cause major events. In the present study, it is not possible for the minor events of a week to 'go back in time' and cause the major stressors of the past year. More generally, though, one has to wonder if there is a reciprocal causal relationship between major and minor stressors. That is, not only do major stressors cause minor stressors, but perhaps minor stressors have a causal influence on major stressors as well. For example, continuing arguments with one's spouse (minor stressors) could lead
to a divorce (a major stressor). For the present study the most defensible theoretical causal link between the two types of events is that major life event stressors cause minor stressors. It was theorized above that while major stressors may have an influence on minor stressors, there also appears to be a substantial portion of minor stressors that are not caused by major stressors. The data produced by the present study are not inconsistent with this formulation. Only about 11 percent of the minor stressors may be said to be result of the direct influence of the major stressors.

There are three qualifications to these statements, though. As was noted in the path analysis section, correlation is no proof of causation. There is always the risk that the relation between major and minor stressors is a product of some third, unmeasured "common cause". Second, interpreting the magnitude of the obtained coefficients as the strength of the effect of major stressors on minor stressors depends on the assumption that both are measured without error. Obviously, the magnitude of the effect requires further empirical substantiation. Assuming that there is no nontrivial third causal variable, and that the measurement of the variables is acceptably accurate, one can conclude that the data are not inconsistent with the
theoretical causal link between major stressors and minor stressors.

The empirical support for the theoretical link between major and minor stressors substantiates the contention that it is important to study the relation between minor stressors and health in the context of major stressors. Major life events are a theoretically important "third common cause" of both physical symptoms and minor stressors. The effect of major life events on physical symptoms and on minor stress needs to be accounted for before one can study the effect of minor life events on physical symptoms.

The relation obtained in the present study between major life events and the occurrence of physical symptoms was consistent with the past research on life events and health. Previous research has suggested that life events may account for approximately 10 percent of the variance of various indices of health (Rabkin and Struening, 1976). In the present study, about 7 percent of the variance in minor physical symptoms was accounted for by major life events. One tentative conclusion is that using the number of minor physical symptoms as an index of health yields a similar association between major life events and health as other indices based on the occurrence of major physical disorders.
Even with the influence of major life events controlled statistically, minor stressors were strongly related to physical symptoms. This was true when the simple frequency counts of minor stressful events were used, and when the subjective weightings of the minor stressful events were considered. The two estimates suggest that the minor stressful events of a week account for 10 percent of the variance in physical symptoms for that week, beyond the physical symptoms associated with the major life events of the year. The more minor stressors experienced, the more physical symptoms. Further, this relation appears to be the same no matter the number of major life events. The nonsignificant interactions of major and minor stressors provide no reason to suspect that the impact on a person's health of one type of stressor changes with the levels of the other types of stressors. Neither measurement approach provided any support for the hypothesis that minor stressors have more impact on health when they occur in the context of many major stressors (or that major stressors have more impact on health when they occur in the context of many minor stressors). Although it is dangerously close to "accepting the null hypothesis", it would appear that
the effects of minor stressors are constant across the range of major stressors.

The results of the present investigation strongly suggest that minor stressful events are related to the occurrence of physical symptoms. Even with the influence of major life events removed, the association was substantial. Further, a substantial portion of the effect of major life events on physical symptoms was mediated through minor stressors. That is, major life events lead to increased levels of minor life events which in turn are associated with increased levels of physical symptoms. To provide even more perspective, the combination of major life events and minor events was predictive of almost twenty percent of the variance of physical symptoms, far exceeding the 'average effect size' of ten percent proposed by Rabkin and Struening (1976). Further, the present results were obtained using frequency counts, which addresses the criticism of Dohrenwend and Shrout (1985) that previous attempts to quantify minor stressors may be confounded by using the distress elicited by the stressor to predict other forms of distress. The present investigation found that minor stressors are associated with physical symptoms whether one uses idiographic weighting schemes or simple frequency counts.
Given these results, the nature of the relation between minor stressors and health deserves further exploration. One goal of stress research is to show that stressful events have some causal influence on physical disorders, psychological disorders, and health in general. The results presented here are not inconsistent with the hypothesized causal links between major stressors, minor stressors, and physical symptoms. The discussion of weak causal modelling and path analysis also provides a useful framework for exploring the limits of a correlational investigation.

The greatest threat to assuming that major and minor stressors cause physical symptoms is that there is some unmeasured "common cause" of all three. The literature on stress-disorder relationships is almost overburdened with theoretically relevant constructs and with debates about the causal relations among these constructs. One particularly troublesome consideration is the argument that stress scales and measures of health and distress may all be influenced by, for want of a better label, the tendency to report negative events. That is, the association between the variables may be a function of individual variation in the tendency to report negative events and emotions. To a limited extent, this concern was addressed by the data
presented by Brantley et al., (1987) and Brantley and Jones, (unpublished). These investigators found particular negative emotional states to be unrelated to scores on their measure of stress. Further, various indices of response bias were not a significant influence on their measure. Thus it does not appear likely that some underlying global response set of endorsing negative events and emotions is accounting for all of the association among life events, minor stress, and physical symptom reporting.

Brown (1974) has pointed out that personality variables could be spuriously increasing the obtained associations between stress and disorder. Brown (1974) uses trait anxiety as an example of how personality variables may be "third common causes". In his alternative theoretical formulation, high trait anxiety is the underlying cause of reporting stressful life events, and of stress and disorders. Trait anxious persons may be more likely to notice stressful events, and to respond to those events with physiological 'stress reactions'. The continuous physiological over-reactivity may result in disorders. In this scenario the relationship between life events and health is a spurious by-product of the relationship between trait anxiety and health. This "outside causal variable"
threat to the conclusion that there is a causal link between stressors and health consequences applies to both major and minor stressors. In future investigations, the path model presented here could be expanded to include trait anxiety and other relevant variables.

The second major threat to interpreting correlational data is the underlying assumption that the variables are measured without error. There is no doubt that the effect sizes obtained in the present study are influenced by various sources of error. The problem is determining whether the results are invalidated by measurement error, or merely either inflated or attenuated. One consideration here is the problem of all retrospective research on the effects of stressful events that Brown has labelled "meaning after effect". In essence, Brown has pointed out that the effect sizes in stress-disorder research may be inflated because the subjects who are in distress may try to "make sense" out of their distress by focusing on the stressors they have experienced. People who are not in distress or experiencing health problems may be experiencing similar numbers of stressors, but since there are no problems to be explained, they have not tried to remember the stressors, and thus report fewer. Ruling out this type
of measurement error requires careful prospective research in which stressors are documented before disorders develop.

A final consideration can be conceptualized as a confound, or as a problem in reciprocal causality. This is the consideration that an illness may have its own stressful effects, or more globally, that sometimes it is difficult to decide whether something is a stressor or a symptom of some disorder, or both. Take for example "having one's sleep disturbed". If there is an outside disturbing factor, such as a crying baby or barking dog, this would seem to be a legitimate stressor. If there is no such factor, one would begin to suspect that perhaps awakening in the middle of the night should be considered a symptom of anxiety or depression. In either case, though, the loss of sleep has its own stressful impact. This leaves researchers in an unacceptable position of needing to include sleep disturbance as both a stressor and an outcome of stress (i.e., symptom). This state of affairs would artificially inflate any association as sleep problems are probably good predictors of sleep problems. To complicate matters further, it seems reasonable to speculate that symptoms may cause stressors. For example, in the present study, a minor physical symptom,
such as a headache, may be causally related to following minor stressors, such as poor performance on a work task or an argument with one's spouse. One can even envision a vicious cycle of stressors causing symptoms, that in turn lead to increasing levels of stressors and symptoms. While it is fun to speculate that western culture may have intuitively provided a break in this cycle, known as weekends, to prevent this escalation, it is not pleasant to contemplate the implications of reciprocal causality for establishing the effect of minor stressors on physical symptoms. The data presented here are not inconsistent with minor stressors causing physical symptoms, but they are also not inconsistent with physical symptoms causing minor stressors, and with a reciprocal causality model. As both Pedhazur (1982) and Cohen and Cohen (1983) point out, causality is not determined from the data, but from logical analysis, theoretical formulations and assumptions, and the knowledge derived from testing these against the data.

Finally, a few of the weaknesses of the present study must be mentioned. First, it must be noted that these data are drawn from a volunteer sample. This is a concern because it is easy to speculate that people who were experiencing high levels of either source of stress
may have chosen not to volunteer for another "hassle" in their lives. One can only wonder if a broader range of scores might have been obtained from the ideal random sample with no subject mortality. One also has to wonder if people who volunteer for a project studying stress may not have their own reasons for volunteering. A second consideration is that the sampling procedure yielded a well educated sample of higher socio-economic status persons. While the scales seem appropriate for this sample, the generality of the results may be limited to white, middle and upper class populations. The third consideration is that the sampling procedure produced a sample that was almost two-thirds female. The importance of this depends on whether there are sex differences in stress - disorder relations, a topic that has received little attention. It does raise the possibility that the results of the present study may be more representative for females than for males.

In conclusion, while minor stressors appear to be strongly related to minor physical symptoms, the nature of this relationship remains obscure. Although the strength of the association is impressive, a number of potential confounds will need to be ruled out before one can conclude that there is a causal relationship between minor stressors and minor physical symptoms. The
present study contributed to this process by controlling for the effect of major stressors, demonstrating that minor stressors have an impact on health, even when the impact of major stressful life events is treated as a third common cause and removed. Further, this was done with both the weighted and the unweighted measurement approaches, suggesting that the association is not simply a function of the confounds that have been pointed out in using the idiographic weightings.

One conclusion is that the influence of minor stressors on physical symptoms certainly deserves further empirical investigation. While research on major life events has been hampered by the ethical considerations involved attempting to randomly assign people to different levels of stressful conditions, it may be possible to use experimental approaches to study the effects of minor stressors. One such design would involve randomly assigning people to conditions that involve high and low levels of minor stressors. Potential minor stressors could include middle of the night telephone calls, evening appointments to complete scales and interviews, enlisting the spouse as a cohort to deliver a variety of minor unpleasant events, and etc. Another approach is to provide training in stress management to create a low stress condition. A variety
of dependent variables suggest themselves, including self monitoring of minor physical discomforts and symptoms, as well as repeated measurement of psychological states. Such an approach would go far in ruling out many of the confounds that have been hypothesized in the literature on life events. Further, ruling out such confounds in investigations of minor events may contribute to understanding of major life events, as minor events may serve as analogues for major events. In conclusion, the investigation of the relation between minor events and physical symptoms holds great promise.
References


hassles, uplifts, and major life events to health status. Health Psychology, 1, 119-136.


Appendix A

The Life Experiences Survey (LES)
PLEASE NOTE:

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These consist of pages:

97-98, 102
Appendix B

The Daily Stress Inventory (DSI)
**DAILY STRESS INVENTORY**

Subject: ___________________________  Date: _______________________

Below are listed a variety of events that may be viewed as stressful or unpleasant. Read each item carefully and decide whether or not that event occurred within the past 24 hours. If the event did not occur, place an “X” in the space next to that item. If the event did occur, indicate the amount of stress that it caused you by placing a number from zero to 7 in the space next to that item (see numbers below). Please answer as honestly as you can so that we may obtain accurate information.

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Number Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>X = did not occur (past 24 hrs.)</td>
<td></td>
</tr>
<tr>
<td>1 = occurred but was not stressful</td>
<td></td>
</tr>
<tr>
<td>2 = caused very little stress</td>
<td></td>
</tr>
<tr>
<td>3 = caused a little stress</td>
<td></td>
</tr>
<tr>
<td>4 = caused some stress</td>
<td></td>
</tr>
<tr>
<td>5 = caused much stress</td>
<td></td>
</tr>
<tr>
<td>6 = caused very much stress</td>
<td></td>
</tr>
<tr>
<td>7 = caused me to panic</td>
<td></td>
</tr>
</tbody>
</table>


Appendix C

The Modified Wahler Physical Symptoms Inventory
Appendix D

The Informed Consent Form
INFORMED CONSENT - STRESS PROJECT

The psychology department at LSU is conducting a survey on stress. We are asking people to complete seven consecutive days of monitoring with the Daily Stress Record, and then to complete some other questionnaires. In this way we can study how environmental, psychological, and physiological factors are related to stress. This project is being directed by Dr. Phillip Brantley of the LSU department of Psychology and of the LSU Medical School. Other principle investigators include James Gilchrist and Glenn Jones, who are doctoral students in the clinical psychology program at LSU.

In return for completing this project, participants will receive a 'stress summary' after all of the data have been collected. The stress summary will give an indication of how a person compares to the other people on his or her stress levels. For this reason, you are asked to include your name, phone number, and address. Otherwise, all information will be kept strictly confidential. No one will be identified personally if any of the information is presented publically (e.g. in journal articles or at conferences).

By signing, you are agreeing to participate in this research project. Of course you may withdraw at any time with no consequences. You also have the right to ask questions, and to have your questions answered to your satisfaction.

Participant (Signature)  Witness

Name                    Date

Address                 Phone
Appendix E

An Introduction to Path Analysis
An Introduction to Path Analysis

As Cohen and Cohen (1983) note, almost all regression studies can be viewed in terms of path analytic models. As the technique is not common in the psychological literature, this section will provide a brief introduction to path analysis.

Path analysis is a set of analytic techniques which has been gaining acceptance in social sciences during the past decade. The techniques are especially appropriate for analyzing non-experimental data and studying patterns of causation among a set of variables. While causality can never be proved using correlational approaches, weak tests of causal models are possible.

In essence, two phases are involved. First, a causal model must be formulated. This step forces the investigator to explicitly state the theoretical relations among the constructs under scrutiny. The stronger the statements about the expected causal links among the variables, the more powerful the analysis.

Once a theoretical statement has been formulated, the analysis reveals if the data are consistent with the causal model. The absence of predicted relationships can disconfirm the proposed model. If the data are not inconsistent with the model, then the theory has
survived this "weak test of the model" (Cohen and Cohen, 1983; Pedhazer, 1982).

The present introduction will focus on 'recursive models', those models in which causality flows in only one direction. That is, models in which a variable cannot be both a cause and an effect of another variable at the same time. For these models, path analysis is an extension or generalization of regression techniques. The assumptions that underlie path analysis of recursive models are those of regression techniques. That is 1) the relations among the variables are linear and additive, and 2) the variables are measured on an interval scale without error. Path analysis further assumes that 1) the relations are causal, 2) that there is no reciprocal causality, and 3) that all relevant variables have been included in the model. Violations of these assumptions have the same implications for path analysis as for regression techniques.

Once a causal model has been formulated, path analysis allow one to study the effects of causal variables on the variables treated as dependent. This is done by decomposing the relations among the variables into components. A direct effect is the effect of a causal variable on a dependent variable with the effects of the other causal variables held constant. This
effect is the path coefficient. The coefficient is the same as the standardized regression coefficient (Beta) in a regression analysis. The major difference between regression and path analyses lies in the stages in which the variables are entered into the equation. Much like the hierarchical regression outlines above, the stages of entering the variables are determined by the order of causal priority. At each stage a dependent variable is regressed upon those variables which are its causes. When all of the causal variables can be entered in sequential order then the path analysis is directly analogous to an ordinary least squares hierarchical regression analysis. On the other hand, where the investigator is unable or unwilling to assign any order of causal priority, and all of the independent variables are treated as inter-correlated causes of the dependent variable, then the path analysis is equivalent to a simultaneous regression analysis, and the interrelations among the causal variables remain 'unanalyzed variance'.

To summarize, there are two major advantages of path analysis. First, to use this approach, the theoretical rational of the experimenter must be made explicit. Further, path analysis provides a framework for formulating causal hypotheses. Second, path analysis
provides an excellent framework for summarizing the often complex inter-relations among a large number of variables.
Curriculum Vitae

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Candidate: Glenn Neil Jones

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Title of Dissertation: The Relation Between Daily Stress and Health

Date of Examination: July 15, 1987

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