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Hardiness in nurses: Relation to stress, social support, coping, and illness

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HARDINESS IN NURSES: RELATION TO STRESS, SOCIAL SUPPORT, COPING, AND ILLNESS

By

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Abstract

HARDINESS IN NURSES: RELATION TO
STRESS, SOCIAL SUPPORT, COPING AND ILLNESS

By

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Recent advances in our understanding of the relationship between stress and illness owe much to the emergence of a psychosocial approach to the study of individuals' susceptibility to illness. Kobasa's model of stress resistance proposes that hardiness, a personality constellation consisting of three attributes, challenge, commitment, and control, is paramount in protecting individuals from becoming ill under stress. Little is known, however, whether all three personality characteristics are needed and what mechanisms may underly stress resistance. A difficulty in assessing the effects of the individual hardiness components arises from certain measurement properties of the hardiness questionnaire, most notably the substantial correlation between the commitment and control scales.

A study was designed to develop an instrument containing empirically distinct measures of challenge,

commitment, and control and to determine whether the relationship between environmental stress, hardiness, social support, coping, and health were consistent with Kobasa's theoretical formulation. A new measure of hardiness incorporating aspects of commitment and control relevant to stress resistance in women was piloted and subsequently revised. The revised version of the hardiness questionnaire was administered to a sample of community health nurses in a propective-longitudinal study. Factor analyses performed on baseline (N=386) and three month follow-up data (N=286) provided support for empirically distinct factors corresponding in content to commitment, control, and challenge.

Research participants also completed measures of social desirability, major life events, network stressors, transformational-like coping, social support, mental strain, and physical illness. Major life events and network stressors exerted a significant adverse effect on health outcomes. No stress buffering effects for the hardiness composite nor any of the components were obtained. Individual components of hardiness that were found to exert positive main effects on health included commitment and internal locus of control - an effect which was significant even after controlling for social desirability. Commitment was found to exert a positive effect on health through coping. The results were interpreted in relation to Existential Personality Theory

and its application to stress resistance in women. The significance of the present investigation and its implications for the conceptualization and measurement of hardiness are discussed.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

CHAPTER I

INTRODUCTION AND BACKGROUND

Recent advances in our understanding of the relationship between stress and illness owe much to the emergence of a psychosocial approach to the study of illness prevention, onset and treatment. Considerable progress has been made in defining the concept and developing operational definitions of stress related factors contributing to illness. The role of individual difference factors such as life style, constitution, health practices, coping strategies, and personality in the etiology of illness has been examined. A significant development in our understanding of the stress-illness relationship is the identification of the hardy personality style. While having a demonstrable association with illness resistance, the hardy personality also has stimulated efforts to expand knowledge of the relationship between personality and illness and to explore the interplay of hardiness and other individual difference factors which promote health.

One research approach involves fractionating the components of hardiness and grouping them into specific

dimensions, each one of which can be studied in terms of its association with illness, thereby facilitating a more specific analysis of what dimensions of hardiness are necessary to promote illness resistance and how the components function together as an overall style of stress resistance. This research approach has posed a considerable methodologic challenge to investigators due in part to difficulties inherent in the measurement of psychological dimensions which comprise an interlocking constellation of personality characteristics.

Another research approach involves the study of hardiness in relation to other psychosocial variables such as social support (Ouellette Kobasa & Puccetti, 1983), health practices (Wiebe & McCollum, 1986), and coping behaviors (Kobasa,1982) in order to determine the mechanisms underlying the stress-buffering effect of hardiness. Both research approaches should not only further knowledge concerning the role of hardiness in the maintenance of health but also enhance the understanding of stress resistance from a psychological perspective. The present study makes use of both approaches in its examination of both the independent and interactive effects of the dimensions of hardiness on stress resistance and the relationship of hardiness to social support and coping. Theoretical considerations suggest that hardiness through its

effects on social support and coping mitigates the effects of stress upon illness. This proposition will be assessed through an examination of the manner in which hardiness, social support and coping mediate the impact of stress upon illness.

Definitions of Stress

Beginning with the work of Selye (1956), considerable attention has been given to defining and analyzing components of stress. Originally conceiving of stress as any noxious stimulus or stressor which places demands upon the individual, Selye later defined stress as a general nonspecific response to internal or external demands imposed on the individual - demands which required some level of readjustment. Whereas Selye studied stress from a phylogenetic perspective focusing upon its physical and physiological ramifications, psychosomatic researchers emphasized those psychological processes underlying the relationship between stress and illness. Investigators such as Alexander (1939) invoked psychodynamic interpretations to account for the etiology of specific diseases such as colitis, ulcers etc. and largely overlooked the role of mediating variables. The individual under stress was viewed as a passive victim of internal conflicts.

With the advent of the "cognitive revolution"

(Dember,1974), the search for psychological factors underlying stress and illness emphasized the individual's active interpretation and evaluation of environmental stimuli as the basis for responding to the stress experience (Arnold,1960; Beck,1984; Mandler, 1975; Lazarus, Opton, Nomikos, & Rankin,1965). Proponents of the cognitive interpretation of stress outlined processes whereby the individual continuously scans the environment for stimuli and then operates upon the environment according to the results of an evaluation of the threat imposed (Averill & Opton, 1968; Lazarus,1966; Lazarus & Folkman, 1984). A common characteristic of these cognitive approaches is the sequence of events that occurs following the impact of stressors upon the individual. That is, cognitive function encompasses all neurological levels of system control, autonomic regulation, elicitation of affect, memory, and mental operation.

More recently, it has been suggested that psychological stress or the readjustment required by unresolved environmental demands could drain the adaptive capacity of the individual and increase susceptibility to a variety of diseases (Dohrenwend & Dohrenwend, 1974; Grunderson & Rahe, 1974; Holmes & Rahe, 1967). Numerous investigators reported that specific life events were associated with mental and

physical illness. Such events have ranged from a shift in residence (Bruhn, Philips, & Wolf, 1972) and job loss (Kasl, Gore, & Cobb, 1975) to spouseless motherhood (Berkman, 1969) and concentration camp experiences (Dohrenwend, 1975; Eitinger, 1973). Some investigators considered life events "objective" stress as these events were considered to be part of the external environment (Gore,1981). To assess the proposition that life events were associated with illness, Holmes and Raye (1967) developed the first standardized list of life events. Holme's and Ray's life events measure was criticised on several grounds (Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978), notably the manner in which items were selected for the scale. The particular events that were chosen for the inventory had been culled from the medical records of hospitalized patients. It is unclear as to whether the events preceded the illness or vice-versa. Other investigators formulated life-event inventories employing healthy samples in their effort to reflect the broader range of environmental demands occurring in the general population as well as to reduce the potential for the confounding of life events with illness (Sarason, Johnson, & Siegal, 1978; Dohrenwend et al, 1978).

Gender Differences in Stressful Life Events

Dohrenwend (1977) interviewed a sample of women and

men to determine what events they had experienced as distressing in the past month. Although men and women reported many of the same events as stressful, women reported a number of additional events as sources of stress that men did not mention including life crises occurring to members of their social network (e.g. friends and neighbors). Models of gender role identification and development provide a basis for understanding this vulnerability of women to network events. Whereas women develop a moral sense that emphasizes commitment to others men construct a morality that stresses commitment to self-advancement (Gilligan, 1982). Women are more likely than men to be nurturant and feel a sense of responsibility for the welfare of others (Miller, 1976; Gilligan, Ward, & Taylor, 1989). Women are more oriented to the needs of those around them (Gilligan, 1982) and report greater levels of empathy than do men (Eisenberg & Lennon, 1983). General population surveys have disclosed that women are more likely than men to cite the well-being of their family members as important sources of concern (Campbell, Converse, Rodgers, 1976; Brody, 1981). These gender differences appear to be connected with traditional gender-role expectations that discourage men from engaging in intimate self-disclosing relationships while sanctioning such bonding in women. Social psychological

research in the areas of self-disclosure (Cozby, 1973; Morgan, 1976; Walker & Wright, 1976), affiliation (Arles & Johnson, 1983; Caldwell & Peplau, 1982; Maccoby & Jacklin, 1974; Wheeler & Nezlek, 1977; Wright, 1982) and help-seeking in times of stress (Goulrash, 1978; Horwitz, 1978) have provided evidence that males and females differ in the prevailing orientation of their interpersonal relationships. Women tend to engage in intimate, emotional, and self-disclosing relationships whereas men pursue social interactions which are primarily task- or activity-oriented and nonintimate. Although it appears that network stressors may increase women's vulnerability to illness, the life-event inventories generally reflect the life events typically experienced by men to a greater extent than they reflect those experienced by women (Belle, 1982, Makosky, 1980).

Evidence for gender differences in vulnerability to life events notwithstanding, cognitively oriented stress researchers did not consider gender role orientation in their approach to the study of the stress-illness connection. They argued that the individual's evaluation of the event should be taken into account, specifically the event's novelty (Eaton, 1978), controllability (Dohrenwend & Martin, 1979), undesirability (Huisani & Neff, 1980; Redfield & Stone, 1979) and predictability (Schulz, 1976) are critical to the events'

illness-inducing potential. Although a significant relationship between stress and illness has been reported in numerous studies employing a wide range of stress indexes, a large portion of variance (typically 90%) was left unaccounted for (Rabkin & Streuning, 1976; Rahe & Arthur, 1978). The investigation of psychological processes underlying the stress-illness relationship was expanded to include mediating variables such as personal disposition and situational factors. An assumption underlying a number of stress-health models such as the "vulnerability" (Rahe, 1974; Caplan & Kallilea, 1976; Gore, 1978) and "stress-strain" models (Garrity, Marx & Somes,1977) was that stress would ultimately lead to adverse health changes. It was not until Kobasa (1979) proposed an alternative theoretical model to explain the stress-illness connection that stress researchers expanded the focus of their investigations to include positive health outcomes.

CHAPTER II

THE HARDINESS MODEL OF STRESS RESISTANCE

In contrast to many previous formulations of stress and illness, Kobasa (1979) proposed that for certain individuals illness is not an inevitable consequence of stress. Moreover, stress could actually exert a positive effect on the individual given an individual's particular mode of perception, reaction, and management of the readjustment necessitated by the event. The central variable in Kobasa's model is hardiness, a personality style consisting of three interrelated facets - challenge, commitment and control. With its roots in Existential Personality Theory and Existential Philosophy, hardiness resembles the broader based global "authentic" personality. Individuals with such personality styles are in a dynamic state of being that is characterized by a process of learning new things about themselves and the environment through active decision-making.

The challenge component of hardiness encompasses a perception of change as stimulating as opposed to threatening. It embodies what Kierkegaard (1954) calls "possibility" or the opportunity for self and others' growth and development. Challenge enables individuals

to anticipate variations in routine as the norm and to orient themselves positively toward the future. Challenge is also embodied in the stress and coping model formulated by Lazarus & Folkman (1984) as a part of the individual's primary appraisal. That is, a judgment the individual makes regarding whether or not the event holds the possibility for personal growth or mastery. Lazarus views challenge as an individual's perception of the stressor that is largely an outcome of the individual transacting with the situation rather than a dispositional attribute.

The challenge component of hardiness is conceptually related to other personality attributes investigated in the stress-illness relationship. For example, Smith, Johnson, and Sarason, (1978) found that students who scored below the median on the Sensation Seeking Scale showed significant positive correlations between severity of negative life changes and level of neuroticism. Kobasa, Maddi & Puccetti (1982) suggest that sensation seeking like the challenge component of hardiness may predispose individuals to perceive change positively. Wheaton (1983) found that inflexibility which implies a tendency to be resistive to change and to favor particular modes of coping in all stressful situations facilitated the adverse effect of stress on psychiatric disturbance.

Commitment is in part derived from the existential notions of "fundamental project" (Sartre, 1956) and "existential a priori" (Binswanger, 1963) and refers to the tendency to imbue whatever one is involved in with a self-constructed purpose or value. It enables individuals to transcend concrete situations on the basis of their self-constructed meaning through the exercise of judgment, imagination, and symbolization. Commitment is demonstrated by one's interest in work, family and friends and embodies a sense of knowing that other people depend on you not to let them down under time of great pressure (Kobasa, 1982). This dimension of hardiness relates to various conceptualizations of perceived social support. The hardy individual would be expected to provide and receive social support. The give and take of social support would be a consequence of the value and purpose inherent in the individual's belief system. Both the outer and inner-directed aspects of commitment lead to the establishment of social support systems and networks of communication that mitigate the effects of stress upon illness (Kobasa, 1979). Commitment is central to other models of stress resistance (Moss 1973, Antonovsky,1982). Antonovsky proposed that commitment subsumes all of the social support findings.

An extensive body of research demonstrates that

social support exerts a positive impact on physical and psychological well being (see reviews by Caplan, 1974; Cassell, 1976; Chen & Cobb, 1960; Cobb, 1976, 1979; Dean & Lin, 1977; Gelein, 1980; Haggerty, 1980; Hambirag & Killilea, 1979; Mitchell & Trickett, 1980; Murawski, Penman, & Schmitt, 1978). Structural support refers to the number, density and embeddedness of the individuals social contacts and has been found to exert a main effect on health outcomes whereas functional social support or the perceived quality of the social relationships exerts a stress buffering effect (Cohen & Wills, 1985).

The control component of the hardy personality style refers to the generalized belief that one has influence on outcomes and implies the perception of being able to apply knowledge and skill. This belief facilitates the expression of coping options even in the most threatening of circumstances. This aspect of hardiness plays a role in a number of other theoretical models which have implications for adaptation to stress. These include Locus of Control (Averill, 1973; Lefcourt,1981; Rotter, Seeman, & Liverant, 1962), the Type A Coronary Prone Behavior Pattern (Glass, 1977), Learned Helplessness (Seligman,1975) and Self- Efficacy models (Bandura, 1963). A number of research studies have demonstrated that distressful physical symptoms

result from a sense of lack of control over the immediate environment (Geer, Davison, & Gatchel, 1970; Mason, 1971; Pennebaker, Burnam, Schaeffer & Harper, 1977) and that the provision of a sense of control (i.e. experimenter) even when such control is illusory facilitates the reduction of distressing symptoms (Langer & Rodin, 1976; Stern, Miller, Evy, & Grant, 1980). Though there exist some findings to the contrary, persons with an external locus of control are more susceptible to pathology-particularly psychopathology than those with an internal locus of control (Lefcourt, 1981). Internal locus of control has been equated with competence, coping ability and relative invulnerability to debilitating effects of stressful events (Campbell, Converse, & Rodgers, 1976). Johnson and Sarason (1978) found that subjects who had an internal locus of control demonstrated a lower correlation between stressful life events and illness than those with an external locus of control. Anderson (1977) found internal control to be associated with more task-related or problem- solving efforts and with less emotional coping. Wheaton (1983) found that fatalism or a belief in the efficacy of environmental rather than personal forces facilitated a deleterious effect of stress on psychological disturbance. Sandler and Lakey (1982) reported that the correlation between negative

events and anxiety was greater for externals than for internals. In addition, they reported that the stress buffering effect of social support was not obtained for externals. These findings are consistent with the proposition that locus of control is associated with stress resistance directly and indirectly (via social support).

Psychosocial Mechanisms Underlying the Hardiness-Health Relationship

Within the rubric of the hardiness model, the capacity to manage or adapt to the environmental change is further elaborated by what is referred to as "transformational coping." This style of coping embodies activeness and approach rather than passivity and avoidance. For example, an individual who fails an examination may consider various coping options. The individual who is high in hardiness may attempt to master the test material individually, pursue another course of study or request tutorial assistance. Even though the event may indicate a personal failure, the hardy individual will construct the situation so that it constitutes an opportunity for growth. Failures are viewed as growth enhancing because they contain information which can be used to revaluate goals, to

reformulate plans and to try again. In regard to coping options, the individual who is low in hardiness may consider dropping out of school completely, delay making a decision with regard to pursuing other educational opportunities or rely on others to make a decision. Such individuals view themselves as passive victims of forces beyond their control with little sense of resource or initiative. They are fearful of change as it seems to disrupt security and comfort. Individuals low in hardiness exhibit fewer transformational-like coping strategies than individuals high in hardiness. Transformational coping leads to a decrease in the stressfulness of events, thereby decreasing their ability to produce sympathetic arousal (i.e. organismic strain) and immune system suppression.

According to Kobasa's model, hardiness mitigates the effects of stress upon illness not only through its effect on transformational coping but also by the way it predisposes individuals to make use of their social support system. Individuals who are high in hardiness seek the kind of social relationships that support optimistic cognitive appraisal. Specifically the hardy personality seeks out social supports that encourage transformational coping in times of stress whereas those who are low in hardiness make use of social supports that may not support or even inhibit transformational

coping (Kobasa, 1979b). The hardiness model thus provides a theoretical framework for not only predicting what types of individuals will stay healthy under stress but also how and when social support can exert a positive and negative impact on health.

Empirical Support For Hardiness Construct

Early research on hardiness sought to identify the personality attributes which discriminated high illness from low illness subjects under stress. Kobasa (1979) systematically investigated the types of personality attributes which play a role in stress resistance in a sample of business exectives. Subjects who experienced both high levels of stress and illness when compared with subjects experiencing high stress and low illness differed on a number of attributes derived from Existential Personality Theory, including nihilism, external locus, powerlessness (negative indicators of control), alienation from self (negative indicator of commitment), and vegetativeness (negative indicator of challenge). The high-stress and high-illness group attained significantly higher scores on these personality measures than did the high-stress low-illness group.

Kobasa and colleagues then examined whether hardy

executives behave in a manner or experience life consistent with the descriptive elements of hardiness. Hardy and non-hardy executives were compared with respect to their affect, coping styles, and level of strain. Kobasa et al. (1983) approached executives on a random basis (via beeper) at frequent intervals during the day to determine what they were doing, thinking and feeling. Executives who were high in hardiness enjoyed what they were doing more across a wide range of work, family and social activities and indicated greater interest and value (commitment), influence (control) and openness in situations (challenge) than did executives who were low in hardiness.

Maddi and Kobasa (1984) also asked executives to describe the most stressful event they had experienced in the last six months and to report the manner in which they managed it. Responses on the Ways of Coping Inventory (Folkman & Lazarus, 1980) indicated that executives who were high in hardiness exhibited higher levels of transformational like coping and lower levels of regressive coping than did executives who were low in hardiness. Maddi and Kobasa (1984) obtained subjective and objective measures of strain from a group of executives once a year for six years. Executives who were low in hardiness had higher blood pressure and reported greater levels of psychological strain

including anxiety, depression, and suspiciousness.

A number of studies examined the impact of hardiness and a number of psychosocial factors that may be involved in the etiology of illness. Ouellette Kobasa, Maddi, Puccetti and Zola (1985) examined the joint effects of hardiness, exercise and perceived work support on concurrent and prospective levels of illness in business executives exposed to high stress levels. Each factor exerted a main effect with estimates of relative effectiveness indicating that hardiness is the most important of the resistant resources studied.

Other studies assessed the stress-buffering effect of hardiness with its three components-challenge, commitment, and control. Hardiness exerted both a main and buffering effect in a series of retrospective designs (Kobasa, Maddi, & Courington, 1981; Kobasa, Maddi, & Puccetti, 1982; Ouellette Kobasa & Puccetti, 1983). These effects were independent of constitutional predisposition (Kobasa et al., 1981) and exercise (Kobasa et al., 1982). Kobasa, Maddi and Kahn (1982) found that hardiness exerted a stress buffering effect when a concurrent estimate of stressful life events was employed, but not when a prospective estimate of life events was used. Kobasa et al. indicated that in some cases the prospective estimate of stressful life events occurred as much as five years before the period used to

estimate illness. Indeed, it is unlikely that subjects could remember very much dating that far back when the recall of events has been demonstrated to drop off at the approximate rate of 5% per month (Jenkins, Hurst, and Rose, 1979). In another analysis of these data, which included the additional variable of constitutional predisposition, both the main effect for stress (prospective estimate only) and the hardiness-stress interaction failed to reach significance when prior illness was controlled.

Kobasa's (1979) stress resistant model posits that hardiness influences the utilization of social support: for the high hardy person, a given level of transformational coping is enhanced by a wide range of social support; for the low hardy person, however, the level of social support does not facilitate transformational coping and may even serve to encourage regressive coping. Kobasa and Puccetti (1983) found that for individuals low in hardiness family support was illness-inducing, although work support was not. Most of Kobasa's executives reported mainly work-related stress. This suggests that low hardy individuals do not make constructive use of the types of social support available to them. Rather, the illness reducing effect may only be apparent for that type of social support which is directly relevant to the nature of the

stressor.

Maddi and Kobasa (1984) investigated whether modifying an individual's level of hardiness could promote illness resistance. In a series of pilot intervention studies involving Chicago Bell executives, Maddi & Kobasa (1984) found that executives who were under high stress and who reported symptoms of strain benefitted significantly from group counselling sessions designed to increase hardiness and transformational coping. An increase in hardiness was associated with a decrease in illness as assessed by self-report and objective measures.

Studies of hardiness conducted with other occupational groups have yielded inconsistent findings with respect to empirical validation of the hardiness model. Kobasa (1982) examined the impact of stress, regressive coping, social support and two components of hardiness-control (powerlessness) and challenge (vegetativeness) on strain and illness in a group of attorneys. Significant predictors of strain included stress, control, challenge, regressive coping, and social support. Social support, or number of persons spoken to, was associated with an increase in illness and was significantly correlated with regressive coping. No relationship was found between stress and illness. These results provide support for control and challenge

constituting illness resistant resources as opposed to stress resistant resources. In contrast to the results obtained with the attorney sample, Kobasa (1982) found a large correlation (r=.58) between stress and illness in a sample of military officers and captains. Contrary to expectations, the challenge component of hardiness exerted a negative impact on illness. The organizational constraints inherent in a military setting may foster an inverse relationship between challenge and health. This underscores the importance of investigating hardiness within a particular environmental context and conceptualizing health and illness phenomena as essentially both intraindividual and social in nature (Kobasa, 1984).

Two studies conducted on college students examined the relationship between hardiness and cognitive appraisal. Rhodewalt and Agustsclottir (1984) found an inverse relationship between hardiness level and the extent to which events were regarded as aversive. Allred and Smith (1989) assessed the relationship between hardiness and number of positive and negative self-statements made under varying stress conditions. Individuals who were high in hardiness endorsed more positive self-statements in the high stress condition than low hardy individuals after controlling for neuroticism. These results are consistent with the

description of the hardy personality in that hardy individuals appear to maintain a more positive cognitive-perceptual set under stress.

With the exception of Rhodewalt and Agustsclottir (1984) who studied both male and female college students, the generalizability of these findings is limited owing to the fact that only male samples were assessed. A number of studies on hardiness in female samples has been conducted. In a sample of outpatients, Kobasa and Hill (1981) found that high stress-low illness patients were hardier than high stress-high illness patients. Schmied and Lawler (1986) assessed the main and stress-buffering effects of hardiness in a sample of secretaries. No main or interaction (stress) effects for hardiness on illness were obtained. The only individual component measure that was found to be related to illness was powerlessness. The authors suggest that the personality characteristics found to constitute stress resistant resources in business executives may not generalize to secretaries due to differential occupational role demands. In a study of Black female bus drivers, Bartone (1984) found hardiness did exert a stress buffering effect on illness. One explanation why hardiness may exert a buffering effect in bus drivers is due to the nature of the occupation which may foster and support the expression of control,

commitment, and challenge in women.

Recently an increasing number of hardiness studies have been conducted in nurses. The hardiness model of stress resistance has aroused much interest on the part of nurse-investigators in expanding the knowledge base of nursing practice and science (Pollock, 1989; Lambert & Lambert, 1987; Lee, 1983). Other investigators have emphasized the potential utility of the hardiness model in understanding those personality characteristics that are well suited to the demands of various nursing subspecialties (Maloney & Bartz, 1983) and promote resistance to staff burnout (Keane, Ducette, & Adler, 1985). Three studies of nurses assessed the relationship between hardiness and staff nurse burnout. Total hardiness was inversely correlated with burnout in two samples of hospital staff nurses (McCrane, Lambert, & Lambert, 1987; Rich & Rich, 1987). The hardiness components of control and commitment were inversely correlated with burnout whereas challenge as assessed by the Security Scale of the California Life Goals Evaluation Schedule was unrelated to burnout in Intensive Care Unit (ICU) and non-ICU nurses (Keane et al., 1985) and other hospital staff (non-ICU) nurses (Rich & Rich, 1987). McCranie et al. (1987) also assessed the stress buffering effects of hardiness and found no evidence of a hardiness-stress buffering effect

on burnout. As only the hardiness total was used in the analysis it is unknown whether there was a buffering effect for any of the hardiness components.

Maloney and Bartz (1983) were interested in exploring the extent to which nurses differ in their level of hardiness as a function of nursing setting and compared the hardiness scores of ICU and non-ICU nurses. Intensive Care Unit nurses had greater alienation, powerlessness, and adventurousness than non-ICU nurses. Maloney and Bartz (1983) suggest that the type of nursing specialty may differentially support the expression of hardiness. These results are not consistent with those reported by Keane (1986) who found no differences between ICU and non-ICU nurses in level of alienation, powerlessness, or adventurousness. Maloney's and Bartz's findings may not be generalizable in light of the unique sample of ICU and non-ICU nurses studied - Army Nurse Corps officers.

Drawing causal inferences is not warranted since all the aforementioned study designs with female samples involved data collected at one point in time. In one prospective study, Wiebe and McCollum (1986) found hardiness accounted for most of the variance in illness, over a three month period, directly and indirectly through its effect on health practices in a sample of predominantly female undergraduates. As was the case

with executives, a prospective estimate of stress failed to exert an effect on illness. One explanation for the lack of a main effect for stress may be due to the inadequacy of the life events inventory as a measure of stress. As noted earlier, typical life events measures do not contain events (e.g. network events) that would be considered illness-inducing for women.

In summary, these findings indicate that personality attributes derived from Existential Personality Theory play an important role in illness resistance. Preliminary findings indicate that hardy individuals perceive, feel and cope with life events in a manner consistent with the description of the hardy personality. By increasing the level of ones's hardiness, improvement in health status can be achieved. The results from retrospective studies of male samples generally reveal main and stress-buffering effects on illness. Research findings in female samples, on the whole, are consistent with the conceptualization of hardiness as an illness resistant resource but do not provide support for a stress buffering effect. The research findings especially in female nurses indicate that challenge may not be related to health in the same way as control and commitment. The results from prospective-longitudinal studies in males and females have not yielded main effects for stress when

prospective life event estimates were used which precludes the possibility of a stress-buffering effect for hardiness. The prospective studies do provide empirical support for hardiness as an illness resistant resource due to a consistent main effect finding. It is unclear whether hardiness influences coping, social support, health practices or has effects upon all three.

Theoretical Issues

A number of theoretical issues can be raised with respect to the hardiness model. Significant main effects for hardiness have emerged across the prospective and retrospective studies in both males and females. However, since hardiness (as a composite of three components), transformational coping, and social support were never assessed in the same study, it is not known whether or not the stress-buffering effect was in fact due to the influence of hardiness on coping or social support. It may be the case that the hardiness effects operate through health practices and not through coping. Only a test of the full model, with all its components can provide evidence in support of the hypothesized relationships.

Another issue relates to whether or not all three components of hardiness are necessary to account for

stress resistance. According to the model, hardiness encompasses an overall style of stress resistance that is most fully expressed when an individual possesses high levels of each of the hardiness components. Individuals who are low in all three stress resistant properties would be expected to be at highest risk for organismic strain and illness. Such individuals would be expected to appraise environmental demands as threats to their security and believe the situation is out of their control. In addition, such individuals would not attach any meaning or purpose to the management of the environmental demands. Individuals who are low in all three components would be least likely to derive the optimal health benefits from social supports and coping for they would utilize social supports which inhibit both optimistic cognitive appraisal of stressful life events and transformational coping.

Individuals who are low in two components of hardiness rather than all three would exhibit some, although limited, aspects of stress resistance. Individuals who are high in the challenge component and low on the control and commitment dimensions would not be threatened at the prospect of encountering change in their lives but fail to appraise their situation as reflecting something meaningful and controllable. They would have a constricted social support system and

engage in passive and avoidant coping strategies. Individuals who are high in commitment and low on the challenge and control dimensions would experience a sense of purpose and value in life, however, be oriented to maintaining the status quo and social supports which encourage passive and avoidant coping strategies. Individuals who are high in control and low in the challenge and commitment dimensions would respond to environmental demands with the use of active and planful coping strategies, however their style of coping would never reach the "transformational" level as such individuals would appraise the demands as threatening and devoid of meaning.

Individuals who are low in only one of the three hardiness components would exhibit more aspects of stress resistance than those who are low in two components however they still lack resources which are capable of increasing their resistance to illness. If a sense of control and commitment are not accompanied by challenge, individuals will appraise life change as threats to security and have limited flexibility in the utilization of coping strategies. If a sense of commitment and challenge are not accompanied by a sense of control, the individual will perceive an event as offering the potential for meaningful growth and development, but will not look upon his or her efforts

as effective in goal attainment. Such a person would be likely to make use of passive coping strategies and tend to rely upon others or upon fate to determine outcomes. If control and challenge are not accompanied by commitment, the individual will appraise environmental demands as controllable and nonthreatening to their security, however, not attach any significance to managing the environmental demands. This individual will have a lower level of social support and its associated lower level of transformational coping.

In essence, individuals who are high in all three hardiness components would appraise environmental demands as an opportunity for meaningful growth, feel they can influence the turn of events, and possess both a broad repertoire of active coping strategies that are at a "transformational" level and social support networks that encourage optimistic cognitive appraisal and transformational coping. Therefore individuals who are high in all three hardiness components would be expected to exhibit the strongest capacity for stress resiliency.

Another theoretical issue relates to whether hardiness exerts a short term stress resistant effect. Most of the research to date on hardiness has assessed the cumulative effects of stress occurring within a six month or one year period. In the study referred to

earlier by Wiebe and McCollum, no stress buffering effect was obtained for hardiness over a three month period. Wiebe and McCollum (1986) suggest that hardiness may take a longer time than three months to exert a stress resistant effect. This explanation, however, is not consistent with the description of the hardy personality. According to the model, individuals who are high in hardiness should be able to short circuit the stress-illness pathway because they possess knowledge of and can apply adaptive coping strategies at the time of stressor impact.

An additional theoretical issue pertains to the selection of the stress resistant personality attributes which resulted from studies conducted with male research participants. It is assumed that these attributes also function as stress resistant resources in women. However it seems that hardiness should include not only dimensions relating to self and work, as contained in the current measure of hardiness, but include family and social relations as well. Based on gender-role theory and research, it would be expected that women's sense of commitment and control in family and other social relationships would be just as important to stress resistance as would be aspects concerning work and self.

Measurement of Hardiness

The current measure of hardiness is problematic in several respects. One issue relates to the delineation of the components of hardiness. Brookings, Bolton, and Hammer (1986), reported high correlations between commitment and certain Personality Factors (PF) factors (Cattell, Eber, & Tatsuoka,1970). These same PF factors were also highly correlated with control particularly among female respondents. In a sample of 92 healthy women at increased risk for breast cancer attending a breast cancer screening clinic, the magnitude of the alpha reliabilities for challenge, commitment, and control were consistent with previous reports (Dermatis, Tross, Rowland, Holland, & Osborne, 1986; see Table 1). However the correlation between commitment and control (r=.58) corresponded to the alpha reliability of the control component (r=.59). This suggests that commitment is not empirically distinct from control. Brookings et al. (1986) suggest that there may be little difference between commitment and control and the items may be tapping a more general trait of alienation.

Factor analyses of the hardiness measure have yielded inconsistent findings regarding the underlying factor structure of the hardiness questionnaire. The

Table 1
Intercorrelations Among Original Hardiness Subscales
For 92 Breast Cancer Prevention Clinic Patients

	Scale	I	II	III
I	Challenge (15 items)	___	.19*	.18*
II	Commitment (15 items)		___	.58**
III	Control (15 items)			___
	Mean[a]	16.8	6.6	8.3
	Standard Deviation	6.2	5.2	4.0
	Range	6 - 38	0 - 34	0 - 20
	Alpha Reliability	.75	.82	.59

[a] The higher the score, the lower the level of challenge, commitment, or control.

*p < .05 **p < .001

inconsistent findings in part can be explained by different versions of the hardiness questionnaire which have evolved since Kobasa's (1979) original study. Factor analyses have been conducted on the following versions of the hardiness questionnaire: 1) the long form includes the Alienation From Work Scale, Alienation From Self Scale, Powerlessness Scale (Maddi, Kobasa, & Hoover, 1979), Internal versus External Locus of Control Scale (Rotter, Seeman, & Liverant, 1962), Security Scale of the California Life Goals Evaluation Schedule (Hahn, 1966) and the Cognitive Structure Scale (Jackson, 1967), 2) revised long form in which the Cognitive Structure Scale has been excluded, 3) a short version includes 36 items which were derived from a principal components factor analysis of the long form conducted on the business executive sample, 4) the Personal Views Survey contains 50 items published by the Hardiness Institute in 1984, and 5) a revised form of the Personal Views Survey published by the Hardiness Institute in 1985 which includes 45 items.

Kobasa et al., (1982), in a factor analysis conducted on the long hardiness form reported one overall factor accounting for 65% of the variance which was interpreted as general hardiness. Another factor analysis yielded three factors whose item content corresponded to challenge, commitment and control

(Kobasa & Maddi, 1982). Funk and Houston (1987) reported the results of a factor analysis performed on the revised long form of the hardiness questionnaire. A two factor solution revealed Alienation From Self, Alienation From Work, and Powerlessness loaded heavily in a positive direction on the first factor and Security along with external locus of control loaded on the second factor in opposite directions. These three studies were conducted on male subjects. Hull, Van Treuren, and Virnelli (1987) reported the results of factor analyses conducted on long and short versions of the hardiness questionnaires in samples of college students totalling over 1000. Unfortunately, Hull et al. (1987) did not report the gender of the research participants. A three factor solution generally corresponding to commitment, control, and challenge was reported for both versions of the hardiness questionnaire. However, with the long version, the powerlessness items (negative indicator of control) loaded on the commitment factor instead of the control factor and the Security items (negative indicator of challenge) loaded on the commitment and control factors. With respect to the factor analytic results of the short hardiness form, the powerlessness and cognitive structure items failed to load in a coherent fashion. The challenge subscale of the hardiness short form had

poor internal consistency (alpha = .41). It is not clear whether the factor analyses reported were conducted in such a way as to limit the solution to three factors or were performed in an unconstrained way to yield three major factors. Thus it is difficult to evaluate the authors' claim that hardiness be regarded as having three separate components.

Rich and Rich (1987) presented the results of principal-components analyses performed on the revised long hardiness form in 100 female staff nurses. Similar to Funk and Houston's findings, a two factor solution was extracted. Alienation from self, alienation from work, powerlessness, and external locus of control loaded heavily on the first factor and security loaded on the second factor.

Kahn (1987) presented the results of a principal components factor analysis performed on the Personal Views Survey items. Three factors were extracted with Factors I and III corresponding to commitment and challenge, respectively. Factor II corresponded to a general hardiness factor containing equal numbers of commitment, challenge, and control items.

In the sample of breast cancer screening patients referred to earlier in which the revised Personal Views Survey was administered (Dermatis et al. 1986), a factor analysis was performed with squared multiple

correlations inserted as communality estimates in the main diagonal to examine the hardiness factor structure (see Appendix A). A four factor solution emerged with factor I reflecting elements of challenge, commitment and control, factor II largely commitment, factor III largely challenge, and factor IV largely reflects elements of challenge and commitment. Many of the items were not factor pure as they loaded substantially on more than one factor. This poses serious difficulties in attempting to examine the effects of the individual hardiness components.

When an oblique rotation of the item responses was attempted the items failed to converge. This condition may result when there is excessive questionnaire item redundancy. A series of multiple linear regressions were performed to examine the extent to which the items were redundant. When each item was regressed on the remaining 44 as shown in Appendix A, 85% of the items were nearly perfect linear combinations of the other items (MR > .8).

In summary, the results of the factor analytic studies do not provide evidence for a reliable factor structure. Some of the studies indicate support for a general hardiness factor whereas others suggest independent dimensions are being assessed in the hardiness measure. The Security Scale and Powerlessness

Scale items, in particular, do not cohere in a meaningful fashion. In versions of the Personal Views Survey there appears to be both a general hardiness factor and specific factors corresponding in content to aspects of commitment or challenge.

Another major concern with respect to the measurement of hardiness arises from the use of primarily negative indicators and inferring a state of hardiness by a low score on the hardiness questionnaire (Funk & Houston, 1987; Rhodewalt & Zone, 1989). Funk and Houston (1987) administered the revised long hardiness form to 120 male undergraduates. The authors reported a significant correlation between hardiness scores and two measures of maladjustment ($r = .25$ and .40). The pattern of hardiness subscale correlations and maladjustment suggested that the scale overlap was largely attributable to alienation from work and powerlessness items and to a lesser degree to alienation from self and external locus of control. These authors recommend the use of components analysis in attempts to refine the measurement of the hardiness construct as it appears that the components are differentially confounded with maladjustment.

Rhodewalt and Zone (1989) also propose that the current measure of hardiness may actually be tapping another construct. In a sample of working women,

Rhodewalt and Zone obtained an interaction effect between hardiness and life change indicating that non-hardy women with negative life change experienced more depression. In addition these authors reported that hardy women expressed a lower restricted range of undesirable life change and suggest that the hardiness questionnaire may be tapping negative affectivity rather than stress resiliency.

A final measurement concern with respect to hardiness is the extent to which the questionnaire is eliciting stylistic responding. With the use of mainly negative indicators acquiescent responding can not be assessed. Another response style bias that has not been assessed with respect to hardiness is social desirability. It appears that the hardiness questionnaire should be revised in order that it yield empirically distinct dimensions with positive and negative exemplars corresponding in content to challenge, commitment and control that could be assessed with respect to stylistic responding. In order to assess the proposition that all three components are essential to exert the maximum stress buffering effect, it is important that the hardiness questionnaire be constructed so that its components can be empirically delineated.

Statistical Approaches For Hardiness Model Testing

Carver (1989) presents two different statistical approaches for testing and evaluating the hardiness model. If it is assumed that hardiness is a unitary phenomenon and imperfectly assessed by measures of commitment, control, and challenge a latent variable approach toward assessment is indicated. Most of the hardiness studies to date which have looked at total hardiness scores are consistent with this approach. An alternate approach Carver refers to as "synergistic" entails a type of hardiness components analysis which involves testing interaction effects. This interactional approach will elucidate whether the hardiness construct exerts an effect over and beyond the sum of its component parts. Messick recommends a similar interactional approach to establish whether the three personality characteristics of commitment, challenge, and control are needed for illness resistance which includes a test of the main effects for each hardiness component prior to inclusion of the two-way and three-way interaction terms in the statistical model (Messick, personal communication, 1987).

Statement of the Problem

The research reviewed above suggests that the hardiness model of stress resistance provides an integrative model for studying the manner in which personality and environmental factors interact to influence physical and psychological well-being. Unfortunately, the bulk of research has concentrated upon an examination of certain components of the model including long term life change, hardiness, regressive coping and social support rather than upon the full model.

Research on hardiness and illness underscores the importance of conducting investigations within a particular environmental context. For example, the reaction of hardy individuals when they are confronted with environmental demands may be influenced by role expectations unique to their occupations. Similarly, it has been argued that the perceptions of the aversiveness and undesirability of environmental demands affect health outcomes. The nature of the person-situation interaction that induced psychological or physical illness has been specified to some degree; however, little is known regarding the process. Although the importance of hardiness as a composite factor mediating person-situation variables cannot be minimized, the present research seeks to extend the study of hardiness

into an examination of the dynamics of the ways in which its components function within the stress process.

It should be noted that although there are many types of environmental stressors which could be assessed within the hardiness model of illness resistance such as urban crowding, multiple role strain, and environmental pollution, a life events approach for assessing stress will be employed in this study. A life events approach is consistent with the seminal research on hardiness (Kobasa, 1979) and also was used in previous studies of hardiness and stress resistance.

With respect to psychological processes underlying stress and illness relationships, Kobasa's (1982) description of the hardy personality strongly suggests that cognitive-perceptual factors operate to reduce the deleterious effects of stress upon health. Kobasa's model emphasizes the role of "conscious psychological processes by which persons efficiently recognize and act on their situation" (Kobasa, 1982, p.6). In response to these issues, a prospective investigation is proposed which will assess the role of hardiness in the face of environmental demands in relation to social support, coping, and health in order to trace the sequential cause and effect network of relationships. The purpose of the present study is threefold: 1) the construction of a hardiness questionnaire such that three empirically

distinct dimensions corresponding to commitment, control, and challenge are measurable, 2) the explanation of both direct and indirect causal roles assumed by personality and environmental factors in the etiology of illness and 3) the determination of whether or not the proposed mediators act in accordance with theoretical predictions. Each of these purposes are represented by the following hypotheses.

Hypothesis 1: Sampling the content domains of hardiness implied by Existential Personality Theory will yield three empirically distinct dimensions whose item content correspond to challenge, commitment, and control. The commitment and control components of hardiness includes facets relating to self, work, family and other social relationships. It is expected that 1a) the challenge dimension will have a greater positive correlation with sensation seeking than it will have with global control or perceived social support, 1b) the commitment dimension will have a greater positive correlation with perceived social support than it will have with sensation seeking or global control, and 1c) the control dimension will have a greater positive correlation with global control than it does with perceived social support or sensation seeking. These correlational findings provide convergent and discriminant evidence for the validity of the components

of the hardiness questionnaire.

Hypothesis 2: The combination of all three components of hardiness- challenge, commitment, and control will exert a greater stress resistant effect than either combinations consisting of two of the components or any single component alone. Sources of environmental stress that are expected to exert a negative impact on health include personal life events and network stress.

Hypothesis 3: Hardiness will buffer the negative effects of stress on illness in women through its effects on social support and coping. This expectation has an empirical and theoretical basis in the research reviewed earlier.

Hypothesis 4a. The control component of hardiness will facilitate illness resistance through its effect on coping. 4b. The commitment component of hardiness will facilitate illness resistance through its effect on utilization of social support.

Hypothesis 5. Individuals who exhibit high rates of employment absenteeism and health care utilization would have lower levels of hardiness than individuals who do not exhibit such behaviors. This expectation is consistent with the conceptualization of hardiness as an illness resistant resource.

Summary and Significance of the Research

On the basis of research outlined above, the following conclusions may be drawn with respect to hardiness: (1) the hardiness questionnaire could benefit from revision in order that item redundancy be minimized, positive indicators be included, and the hardiness components can be delineated empirically, (2) it bears an independent, predictive relationship with illness resistance and (3) it is related to coping and social support. Major issues concerning the conceptualization and measurement of hardiness are still unresolved. Are all three components really necessary to promote stress resistance? If so, why are they needed and do they exert a stress-resistant effect over short time intervals? What are the mechanisms which underlie the association between hardiness and illness? Do the personality characteristics of challenge, commitment, and control play the superordinate role among psychosocial variables influencing the stress-illness connection in women? The proposed study addresses a well-established need further to examine both the hardiness composite and its individual components in order better to understand predictors of stress responses that may be involved in the development of illness. In addition, social support and coping seem to constitute promising targets for such inquiry, as they

both appear to moderate the illness-inducing effects of life stress. From an existential theoretical formulation of stress resistance, hardiness attenuates the effects of stress upon illness through its effect on social support and coping. There have been no attempts to test this hypothesis. The present investigation therefore represents an important extension of the Kobasa et al. studies through its examination of the short term stress-buffering effect of hardiness which operates through the variables of coping and social support.

The examination of hardiness in the stress-illness relationship in women is a response to unresolved issues in both the stressful life events and hardiness literatures. Research on hardiness has been based primarily on attributes found to be effective stress-buffers in males. This approach has met with some success in women, although a different causal mechanism underlying the illness resistant effect was implicated (Wiebe & McCollum, 1986). The proposed research takes a different approach by attempting to redefine those dimensions of environmental stress and personality that are relevant to the stress illness connection in women--i.e. network events and commitment and control in family and social relationships. The prospective longitudinal design permits an assessment of the

association between hardiness, social support, and coping in a manner which is consistent with Maddi's and Kobasa's (1984) theorizing and that could account for the process in which hardiness attenuates the effects of stress upon illness.

CHAPTER III

METHOD

Overview

The study was carried out in two phases. During Phase I two pilot studies were conducted with samples of convenience. The objective of the first pilot study was to identify occupational demands experienced by community health nurses. The objective of the second pilot study was to examine the psychometric properties of the preliminary version of a newly revised hardiness questionnaire. The results of the pilot studies provided information that was incorporated into Phase II of this research - a broader study which consisted of a prospective-longitudinal design. The main objective of the prospective-longitudinal study was to determine if all three components of hardiness were needed for stress resistance and to identify the psychosocial mechanisms underlying the relationship between hardiness and illness resistance. Research participants were given measures of hardiness, social desirability, social support, strain, illness, stressful life events, sensation-seeking, locus of control, and coping. Assessments of all variables were taken three months later (a copy of the instruments are available in

Appendix B). A summary of the research design is presented in Table 2. A three month period between baseline and followup assessments was chosen in order to enable a test of the short term stress buffering effects of hardiness. It will be recalled that in the one study (Wiebe & McCollum, 1986) which assessed the short term stress buffering effect of hardiness no effect was obtained. A description of the subjects, modes of assessment, and principal data analyses for the Phase I and Phase II studies are presented below.

Phase I - Pilot Studies

Study 1 Subjects: Community health nurses were recruited from community health nursing agencies located within the NYC area and outlying suburbs. Community health nurses were selected for study because they comprise a population at enhanced risk for illness. The demands of the occupation are many and varied particularly in light of the current acute nursing shortage: excessive patient caseloads, mandatory overtime, and frequent shifting of job priorities to accommodate emergency requests. The nurse's susceptibility to illness is increased on two fronts--the demands of the job are often both physically and emotionally draining, and direct exposure to patients who have contagious illnesses. Given these

Table 2 Summary of Research Design

PHASE I - Pilot Studies

1. Community health nurses enumerated occupational stressors (N = 50).

2. Community health care workers completed Pilot Hardiness Questionnaire and Jackson Social Desirability Scale (N = 118).

PHASE II - Prospective-Longitudinal Study

Subjects: Community Health Nurses

Projected Number of Research Participants

Approached	1500
Consented	500
Baseline	400 (20% Attrition)
3 Months	320 (20% Attrition)

Variables Assessed:

Baseline ——————————————————————————>3 Months

1.	Revised Hardiness Questionnaire	Repeat
2.	Social Desirability	Baseline
3.	Social Support	Measures
4.	Mental Strain	1 - 10
5.	Physical Illness	
6.	Environmental Stress	
7.	Sensation-Seeking	
8.	Locus of Control	
9.	Coping	
10.	Health Practices	
11.	Demographics	
12.	Employment Characteristics	

situational demands, the public health setting rewards nurses who demonstrate autonomy, flexibility and initiative via promotion, alternate work experience (selected by the nurse) and occasionally pay increases. The prevailing ideology of the work environment can be characterized by resilience and endurance under stress. The public health nurse setting's system of reinforcement and role expectations foster the development and expression of hardiness. A total of 50 community health nurses participated in the study.

Modes of Assessment:

Research participants were asked to list the types of occupational demands encountered by community health nurses. These occupational life events were added to the standard life events inventory employed in the prospective-longitudinal study in order to provide a more comprehensive measure of life event stress in keeping with Kobasa's approach (1982) to include events peculiar to the distinctive population under study.

Principal Data Analyses: A content analysis was performed to identify occupational categories of life events and the frequency of endorsement for each category was obtained.

Study 2 Subjects

A total of 118 female health care workers employed in community health care settings were recruited to the

study.

Modes of Assessment

Pilot Hardiness Questionnaire and Jackson Social Desirability Scale

As noted earlier, there appears to be a high level of item redundancy in the current version of the hardiness questionnaire (revised Personal Views Survey). This questionnaire was revised in accordance with a sequential strategy designed to foster the construct validity of the instrument (Jackson, 1970; 1971; Jackson & Messick, 1958). Both a rational and factorial approach were incorporated as they are most congenial to a construct validity framework (Messick, 1981). The procedure emphasizes: (1) the importance of psychological theory; (2) the necessity for suppressing response style variance; (3) convergent and discriminant item selection procedures and validation and (4) scale homogeneity and generalizability.

Most of the hardiness items were rewritten and edited for: (1) conformity to the scale to which they belong; (2) broad sampling of circumstances; and (3) balancing of positive and negative exemplars (to minimize potential for acquiescent responding). A set of new items were written to tap family and other social relationship domains. In keeping with Loevinger's (1957) substantive consideration in

establishing construct validity, it is necessary to specify the potential universe of content and map out facets of each component of hardiness, thereby subjecting the content to analysis and dimension specification. This preliminary item pool (see Appendix B.1) and Jackson's Social Desirability Scale (see Appendix B.2) were administered to the sample.

Principal Data Analyses

Research participants evaluated each hardiness item with respect to six response categories ranging from strongly disagree (1) to strongly agree (6). To minimize extremity of response style bias, all item responses were scored as dichotomous variables (i.e. 0,1). Classical factor analytic techniques were employed in the selection of scale items. Classical factor analytic techniques entail the use of multiple squared correlations on the diagonal of the matrix. This approach was employed because it provides a factor analytic solution that accounts for the shared variance among the items. This factor analytic technique contrasts with that of principal components in which ones are placed on the diagonal of the matrix and the total amount of variance (i.e. 100%) is explained. Items were selected for the new version of the hardiness questionnaire that had a low or zero correlation with social desirability and were not highly

redundant. The Differential Reliabililty Index (DRI) is computed by taking the square root of an item's correlation with its own scale total (scale total does not include item being assessed) minus the correlation of the item with social desirability. The DRI will indicate which items are correlated more with social desirability than with their own scale.

Neil and Jackson (1976) indicate that inclusion of items cannot reasonably be made on statistical properties alone. The reduced set of items were assessed for representativeness of content, lack of ambiguity, substantive cogency, and inclusion of both positive and negative exemplars and revised or supplemented accordingly in order to develop an instrument with empirically distinct dimensions corresponding to challenge, commitment, and control as proposed in Hypothesis 1. This set of items was employed in the prospective longitudinal analysis.

Phase II - Prospective-Longitudinal Study

Subjects

Participants were recruited from a professional nurses organization. Community health nurses whose names were drawn at random from the organization's membership list were offered participation (Appendix C contains a copy of the research participant recruitment letter). According to Dillman (1978) approximately one

third of persons approached for mail survey studies consent to participation. Therefore 1500 members were offered participation in order to ensure that a sufficient number of completed questionnaires were returned at the baseline and followup assessments. It was expected that approximately 400 completed questionnaires would be returned at baseline and 320 at the three month followup assessment. These estimates were based upon a 20% attrition rate at both the baseline and followup assessents. This sample size would satisfy the requirements for the planned statistical analyses.

Sociodemographic and Employment Characteristics Of Community Health Nurse Sample

Five hundred (33%) of the nurses consented to participate in this study. Three hundred ninety-six nurses out of the 500 (79%) who initially consented completed the questionnaires at time of baseline assessment. Two hundred eighty-four (72%) of the 396 nurses completing the initial assessment also completed the followup questionnaire. As shown in Table 3 most of the respondents were females (96%), caucasian (95%), and married (59%). They demonstrated considerable variability with respect to age with the mean being 43.07 and range 23-91. Two hundred forty (62%) respondents had children with the mean being 2.33.

Table 3
Sociodemographic and Employment Characteristics of Public Health Nurse Sample

Characteristic	N	(%)
SEX		
Male	17	(4)
Female	366	(96)
RACE		
Caucasian	369	(95)
African-American	15	(3)
Oriental/Asian-American	2	(1)
Other	1	(1)
MARITAL STATUS		
Never Married	91	(24)
Married	229	(59)
Widowed	11	(3)
Separated	9	(2)
Divorced	46	(12)
LEVEL OF EDUCATION		
No college degree	26	(7)
Associates degree	26	(7)
Four year college degree	169	(44)
Graduate degree	166	(42)
NURSING POSITION		
Registered Nurse	342	(89)
Licensed Practical Nurse	4	(1)
Other	40	(10)
EMPLOYMENT SETTING		
Suburban	86	(22)
Urban	141	(36)
Rural	64	(17)
Combination of Above	96	(25)

Table 3 (Continued)
Sociodemographic and Employment Characteristics of Public Health Nurse Sample

Characteristic	Mean	SD	Range
AGE (N=388)	43.07	11.06	23-91
NUMBER OF CHILDREN (N=240)	2.33	1.18	1-7
NUMBER OF YEARS EMPLOYED IN NURSING (N=388)	17.76	10.30	1-50
NUMBER OF YEARS EMPLOYED IN COMMUNITY NURSING (N=388)	9.05	7.83	1-39
NUMBER OF YEARS EMPLOYED IN CARE OF TERMINALLY ILL (N=388)	4.35	4.13	1-20

Most nurses had at the minimum a bachelor of science degree in nursing. Twenty-six respondents (7%) received a nursing diploma from a hospital affiliated school of nursing and had no college degree.

Table 3 presents the employment characteristics of the study sample. Most respondents (89%) were employed as community health nurses. Ten percent of the nurses indicated they were employed in other positions in community health nursing including college instructor, administrator, supervisor, or family nurse practitioner. Most of the nurses had their RN license (89%) and were employed in an urban health setting either part of the time or exclusively. There was a tendency for nurses to go into community nursing after having worked in general nursing as reflected in the mean number of years employed in nursing versus community nursing (17.76 versus 9.05). Two hundred ninety-eight nurses (77%) reported being employed in the care of the terminally ill (e.g. hospice) with the mean being 4.35 years.

Another set of background characteristics included general health practices (See Table 4). The majority of research participants monitored their diet, got annual physical exams, and cut down or avoided alcohol intake. Adverse health practices such as overeating, regularly sleeping less than 8 hours a night, smoking,

Table 4
Frequency of Nurses' Endorsement of Health Care Practices at Baseline and Three Month Followup

Health Practice	Baseline (N=385)		3 Months (N=274)	
	N	(%)	N	(%)
Monitoring Diet	284	(74)	213	(78)
Annual Physical Exams	240	(62)	177	(65)
Cut Down or Avoid Alcohol Intake	212	(55)	144	(53)
Take Vitamin and Mineral Supplements	211	(54)	157	(57)
Overeating	190	(49)	129	(47)
Regularly sleeping less than 8 hours a night	150	(39)	118	(43)
Practice yoga, meditation, or relaxation techniques	97	(25)	73	(27)
Smoke Cigarettes	71	(18)	48	(18)
Minimize vigorous physical activity	65	(17)	44	(16)
Avoidance of or infrequent use of seat belts	40	(10)	48	(10)

minimizing vigorous physical activity, and infrequent use of seat belts were less frequently endorsed.

Research participants completing the second assessment did not differ significantly from those who did not complete the followup questionnaire with respect to any of the sociodemographic factors, health practices, or employment variables with the exception of type of setting employed in. Research participants completing the followup questionnaire were more likely to be employed in a rural setting ($X^2 = 7.20$, $P < .01$).

Modes of Assessment

Hardiness

The revised hardiness questionnaire that was administered in the prospective-longitudinal study was based upon the results of Pilot Study #2 in which the preliminary pool of hardiness items was tested (see Appendix B.3).

Social Desirability

In addition to the Social Desirability Scale of the Personality Research Form (Jackson, 1967, see Appendix B.2), the Marlowe-Crown Social Desirability Scale (MCSDS) was administered to permit a more comprehensive analysis of the relationship of the revised hardiness measure to social desirability.

Social Support

The Revised Resources and Social Supports Measure (Myers, 1981) includes five key variables: perceived importance of receiving social support, the number of persons in the primary support network, social composition of the network, perceived satisfaction with social support received, and perceived social support reciprocity (see Appendix B.5). All these social support indices are being assessed with respect to their relation to the hardiness components. However the major variable of interest with respect to the mechanism underlying stress buffering effects is perceived satisfaction with social support as this index has been most implicated in the stress-illness relationship.

Mental Strain

The Somatization Scale of the Hopkins Symptom Checklist (HSCL-Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) is a self-report rating scale of physical symptomatology considered to be stress related. The HSCL Somatization Scale is comprised of 12 items pertaining to a wide range of physical symptoms (see Appendix B.6). A substantial body of research has demonstrated support for the measure's reliability and validity.

Physical Illness

The Seriousness of Illness Rating Scale (Wyler,

Masuda, & Holmes, 1968) contains a comprehensive list of commonly recognized physical and mental symptoms of disease (see Appendix B.7). This has been widely employed in studies of stress and illness and has established reliability and validity (Kobasa, Maddi & Courington, 1981).

Environmental Stress

Stress will be assessed in two ways. The Psychiatric Epidemiological Research Inventory (Dohrenwend et al., 1978) contains a list of 103 events selected from interviews conducted with a community based sample. Categories of events were added based upon the findings of pilot study 1. Research participants were asked to check off what events occurred to them during the past six months at the baseline assessment and during the past three months at the followup assessment. Respondents were also asked to indicate the frequency of occurrence and emotional impact of each of the events on them (see Appendix B.8). The personal life events score was calculated by summing the life events after having been weighted by their frequency of occurrence. The life events were scored in this manner because the chronicity of the event was felt to be related to its illness inducing potential (Messick, 1987; personal communication). The perceived emotional impact of the event was assessed in

relation to the challenge component. It was expected that individuals who were higher in challenge would appraise events less negatively.

In addition, participants were asked to indicate whether or not any major events occurred to members of the social network they have listed on the social support questionnaire. Participants were then asked to rate the impact of each item on the primary social network member and on themselves on a 7 point scale ranging from extremely negative impact (-3) to extremely positive effect (+3) (see Appendix B.5). The network stress score, a measure of overall network stress, was calculated by summing the number of events reported that had a negative impact on the respondent divided by the total number of persons in the primary social network. The impact of the network event on the person's significant other was not included in the respondent's score.

Sensation-Seeking

The Sensation Seeking Scale (Zuckerman, Kolin, Price & Zoob, 1964) is a measure of the "need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences" (Zuckerman, 1979 p. 10) (see Appendix B.9). The Sensation Seeking Scale has acceptable reliability and is related to intolerance for

confinement and immobility aspects of sensory deprivation (Zuckerman, Persky, Hopkins, Murtaugh, Basu, & Schilling, 1966).

Locus of Control

The Internal-External Locus of Control Scale (Rotter, 1966) assesses the extent to which individuals view their world as being controlled by external sources or within their own control (see Appendix B.10). This scale has been widely employed in studies of health outcomes and has established reliability and validity.

Coping

The Self-Control Scale (Rosenbaum, 1980) assesses coping behaviors including: 1) the use of cognitions and self-instructions in the management of emotional and physiological reactions; 2) the application of problem-solving strategies such as planning, problem definition, the evaluation of alternatives and anticipation of consequences; and 3) the ability to delay immediate gratification. This instrument assesses mainly cognitive skills regarding the self-regulation of emotions, pain, and cognitions. It does not assess intellectual, motoric or social skills (see Appendix B.11). This measure is consistent with Kobasa's conceptualization of transformational coping.

Personal Background Questionnaire

This brief self-report questionnaire contains questions

pertaining to sociodemographic and employment status, genetic predisposition to illness, and health practices. With the exception of the health practice items the questions were constructed by the investigator. The health practices component was adapted from the Personal Risk Profile Form of the AT & T (1985), Health and Organizational survey. In addition, items were included concerning work attendance and health care utilization (see Appendix B.12).

Principal Data Analyses

Factor analyses were conducted on the revised hardiness questionnaire items at baseline and three month assessments to test whether the underlying factor structure contained empirically distinct dimensions corresponding in content to challenge, commitment, and control as proposed in Hypothesis 1 and to assess the stability of the factor structure. The Factor Similarity Index (FSI) was computed in order to assess the extent to which factor loadings at baseline were similar to the factor loadings obtained at 3 months. The FSI is computed by taking the sum of the crossproducts of the coefficients between rotated factor loadings and dividing by the square root of the sum of the squares.

Reliability estimates based upon the factors'

internal consistency (Cronbach's alpha) and stability (3 month test-retest correlation) were determined. This measurement approach is consistent with that used by Kobasa and Maddi (1982) who reported internal consistency estimates in the .80's and five year test-retest reliability of .61. It could be argued that since hardiness has been shown to be amenable to an intervention results concerning the test-retest reliability could be misleading. Some individuals may have modified their level of hardiness if for example they had undergone some form of existential cognitive-behavioral therapy. The assumption underlying the measurement of the hardiness construct in this study is that the research participants have not altered their level of hardiness within the three month study period.

Pearson correlations were run on the individual components of hardiness with sensation-seeking, external locus, and perceived social support indices. This provided some evidence for convergent and discriminant validity of the newly developed measures as proposed in Hypotheses 1a, 1b, and 1c.

To test whether or not all three personality attributes are necessary for a maximum stress resistant effect to be achieved as stated in Hypothesis 2, seven hierarchical multiple linear regression models were tested with stress entered in first, then hardiness

(composite or components), and finally the stress-personality interaction terms. Hardiness was entered in as 1) a combination of all three components 2) combinations of challenge + commitment, challenge + control, and control + commitment and 3) each component individually. These analyses yielded information concerning the additive effects of the hardiness components on health.

The nature of the main effects for total hardiness and its components was further explored using an interactional approach. The interaction terms are multiplicative measures. For example, the challenge-commitment interaction term is calculated by multiplying challenge and commitment. Of major interest is whether challenge, commitment, and control are all required for illness resistance as proposed in Hypothesis 2. Hierarchical multiple regression analyses were performed with health outcome (strain or physical illness) regressed on the individual components of hardiness followed by the two-way interaction terms and then the three-way interaction term. A significant effect for the three-way interaction term would yield support for a "synergistic" effect - that is the effect for hardiness on health is more than the sum of its components.

To test whether hardiness facilitates stress

resistance through its effects on social support and coping as stated in Hypothesis 3, two multiple regressions could have been performed i.e. illness = stress, hardiness*stress*coping, illness = stress, hardiness*stress*social support. However since hardiness is expected to be significantly correlated with coping and social support, a clearly interpretable triple interaction effect is not likely. Therefore the stress buffering effect of coping for high hardy and low hardy respondents was assessed using separate hierarchical multiple regression analyses for high hardy and low hardy groups. The stress-buffering effect was tested as the significance added by the stress (prospective)*coping interaction term to the prediction of illness after the main effect of stress and coping are partialled out (Cohen & Cohen, 1975). Similarly, the stress buffering effect of social support for individuals who are high and low in social support will be assessed using separate hierarchical multiple regression analyses for the high hardy and low hardy groups. The stress-buffering effect will be tested as the significance added by the stress*social support (time 1 - time 2) interaction term to the prediction of illness after the main effects of stress and social support are partialled out.

Path analysis techniques were planned to explore

the relationships among control, coping, commitment, social support, life events, and illness as proposed in Hypotheses 4a and 4b. The path analysis shown in Figure 1 will allow estimation of 1) the direct effects of control on illness (arrow a), 2) the indirect effects of control on illness through its effect on coping (arrows b & c), and 3) the direct effects of life events (d) and network stress (e) on illness.

The path analysis shown in Figure 2 will allow estimation of 1)the direct effects of commitment on illness (arrow a), 2) the indirect effects of commitment on illness through its effect on social support (arrows b & c), and 3) the direct effects of life events (d) and network stress (e) on illness. As an adjunct to the path analyses correlational analyses were conducted to identify background characteristics (i.e. sociodemographic, employment, and health practices) that were significant correlates of illness. Variables which were significant correlates of illness were included in the path model.

Finally, a series of analysis of variance tests were performed to examine whether individuals who demonstrated high rates of employment absenteeism and health care utilization differed in hardiness from individuals who did not exhibit these behaviors as proposed in Hypothesis 5.

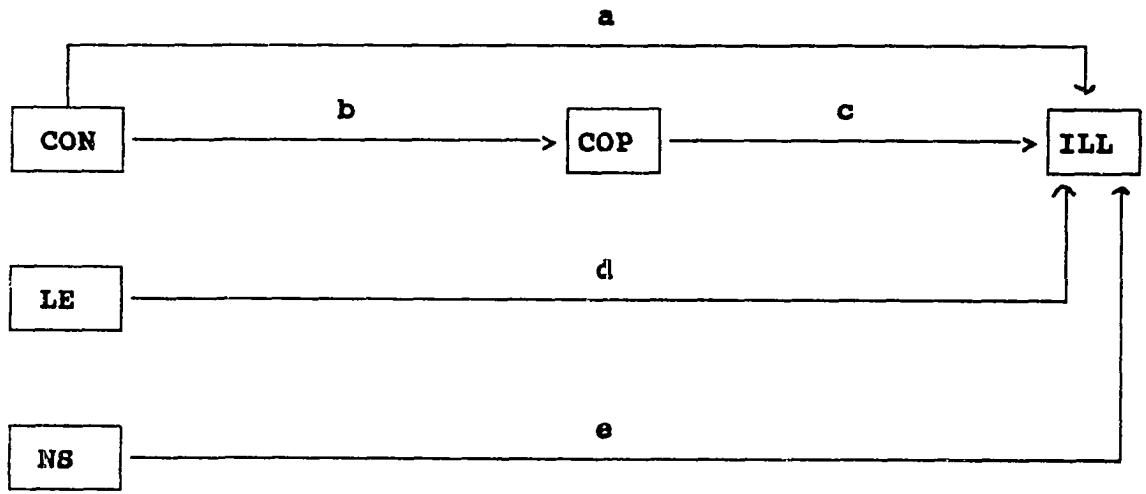

Figure 1 Path Model for the Relationships Among Control, Coping, Stress, and Illness

Note: CON = Control, LE = Life Events, NS = Network Stress, COP = Coping, ILL = Physical Illness.

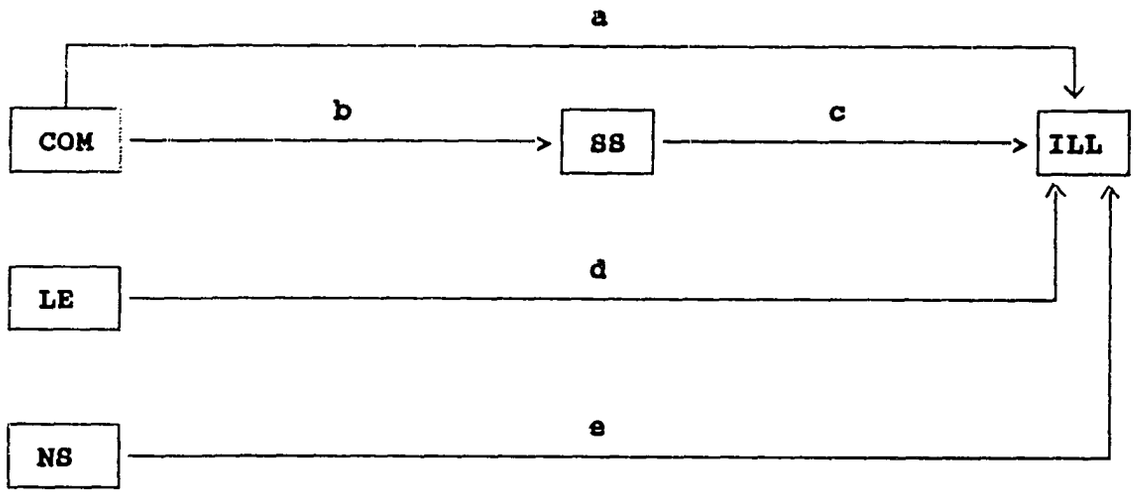

Figure 2 Path Model for the Relationships Among Commitment Social Support, Stress, and Illness

Note: COM = Commitment, LE = Life Events, NS = Network Stress, SS = Social Support, ILL = Physical Illness.

CHAPTER IV

RESULTS

Phase I - Pilot Study 1

The results of the study indicated that community health nurses experienced five major types of occupational demands. Requests for excessive written documentation on patient charts was most frequently endorsed (70%) followed by lack of reliable ancillary patient services (64%), excessive workload upon returning to work after taking days off (62%), lack of supervisory input in management of patient caseload (55%) and lack of communication with coworkers (44%).

Phase I - Pilot Study 2

Factor Structure of Pilot Hardiness Questionnaire

A factor analysis was performed with squared multiple correlations inserted as communality estimates in the main diagonal. The mean squared multiple correlation was .60. Twenty-one factors were extracted with the latent roots of 10.44, 3.31, 2.86, 2.33, 2.27, 1.83, 1.77, 1.56, 1.45, 1.37, 1.27, 1.23, 1.16, .95, .91, .85, .80, .77, .74, .65, .58. On the basis of Cattel's (1965) Scree Test 5 factors were retained for rotation and interpretation. As it was expected that

the factors would be intercorrelated, an oblique rotation was performed.

As shown in Table 5, 18 items can be associated with Factor I (9 of which load above .5), 10 items with Factor II (2 of which load above .5), 8 items with Factor III (2 of which loaded above .5), 9 items with Factor IV (3 of which loaded above .5), and 10 items with Factor V (1 of which loaded above .5). Factor I was defined principally by high positive loadings for items reflecting lack of commitment to self and work. Factor II was defined principally by high positive loadings for items reflecting the positive appraisal of novel, changeable, and unpredictable situations. Factor III was defined primarily by positive loadings for items reflecting commitment and control with respect to family relationships. Factor IV was defined by both positive and negative loadings for items reflecting commitment and control with respect to relationships with friends. Factor V was defined by both positive and negative loadings for items reflecting behavioral aspects of challenge. Elements of control were spread across the five factors with no one factor representing purely control.

Table 5
Moderate to High-Loading Items on Each of the Five Factors from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor I Items	KEY[a]	I	II	III	IV	V	DRI[b]
I work only because I need the money.	-	.46	-.13	-.20	.05	.14	.00
I feel that life is passing me by and that I'm not getting anything out of it.	-	.53	.00	-.17	.07	.24	.22
The amount of effort you put into your work does not have much to do with whether you will get promoted.	-	.48	.15	.18	.21	-.12	.14
I have little interest in my work.	-	.73	.09	-.08	-.03	.06	.32
In obtaining a job, whom you know is more important than what you know.	-	.38	.11	.05	.07	-.05	.10
I like to avoid thinking about changes that may occur in the future.	-	.39	.09	.13	.03	.35	.04

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor I Items	KEY	I	II	III	IV	V	DRI[b]
No matter what I do nothing seems worthwhile.	-	.58	-.19	-.04	.05	.00	.0
I feel a sense of accomplishment with the way I spend my days.	+	-.56	.07	.23	.06	.01	.24
I work hard at my job but it's only the boss who benefits.	-	.70	.15	.16	.05	-.02	.24
I feel uneasy when I think about my life changing from what it is now.	-	.37	-.05	.14	.03	.11	.06
I think about taking early retirement from my job.	-	.42	-.12	-.02	-.06	.00	.28
My day is spent meeting demands made on me by other people.	-	.31	.01	-.07	-.17	.16	.00
Most of my work is just too boring to be worthwhile.	-	.60	.07	-.17	.27	-.10	.36

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors
from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor I Items	KEY	I	II	III	IV	V	DRI[b]
Most of my life gets wasted doing things that don't mean anything.	-	.61	.01	-.22	.25	-.03	.09
I value my work.	+	-.63	.10	.24	.02	-.07	.39
Most of my life is spent doing things that don't mean very much to others.	-	.47	.01	-.04	.35	-.17	.20
It seems that everytime I try to get ahead at work something gets in my way.	-	.55	-.03	-.00	.02	.02	.00
I feel that I can not influence what happens to me.	-	.49	-.06	.05	.36	.06	.28
Factor II							
If a good friend were to move away, it would be important to me to maintain contact regardless of the distance.	+	.04	.34	.11	-.03	.17	.00

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors
from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor II Items	KEY	I	II	III	IV	V	DRI[b]
Socializing with others is not usually a waste of time.	+	-.03	.32	.17	-.29	.12	.17
People who seek out novel experiences are better off than those who don't.	+	.18	.54	-.15	-.03	.04	.23
Unpredictable situations can provide opportunities for growth.	+	-.16	.47	-.17	.01	-.20	.06
I am more likely to win at a game skill than at a game of chance.	+	.05	.32	.04	.00	.00	.00
I like learning new things about myself.	+	.00	.36	.07	-.04	.05	.14
People who welcome change have a greater opportunity to improve their lives than those who avoid change.	+	-.01	.47	.12	.11	-.15	.17
Although I may be unsure of the consequences, I don't mind being asked to do something at work that I've never done before.	+	-.32	.43	.01	.08	-.04	.00

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor II Items	KEY	I	II	III	IV	V	DRI[b]
I feel that what I have to say does have an influence on my coworkers.	+	-.05	.33	-.03	-.19	-.22	.00
I see changes in my job as opportunities for growth.	+	-.49	.58	-.00	.11	.08	.10
Factor III							
Being with family is boring.	-	.29	.10	-.39	.13	.13	.20
My family is not likely to ignore advice I give them.	+	-.11	.05	.46	-.07	-.12	.00
Traditional values and customs should be maintained at all costs.	-	.19	-.10	.44	-.09	.11	.00
I feel that what I have to say can influence my family.	+	-.24	.11	.58	-.04	.00	.00
There isn't much I can do to settle a family argument.	-	.32	.11	-.35	.32	.12	.07

KEY[a] - = Item negatively keyed, + = Item positively keyed.

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors
from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor III Items	KEY	I	II	III	IV	V	DRI[b]
I find it hard to believe people who tell me that the work they do is of no value.	-	-.01	.17	.42	.16	-.02	.07
If I could not spend time with my family, I would feel that there was something lacking in my life.	+	-.04	.02	.44	-.08	-.06	.00
I place great importance on maintaining family ties.	+	-.25	.05	.64	-.04	.09	.00
Factor IV Items							
I am usually not able to persuade my friends to change their minds about something.	-	.18	-.08	-.07	.33	.13	.17
I do not prefer a challenging task if I can have one that is routine.	-	.19	-.24	.19	.31	.10	.27
I place little value on such things as home and family.	-	.00	-.08	-.27	.42	-.07	.10

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors
from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor IV Items	KEY	I	II	III	IV	V	DRI[b]
When a friend of mine is in a bad mood, there is little I can do to change the situation.	-	.00	.05	-.04	.62	.03	.00
Once I make a mistake, there's not very much I can do to correct it.	-	.09	-.02	.13	.47	.24	.00
People come to me when they need help with a challenging task.	+	.01	.33	.16	-.39	-.13	.00
I don't think my friends would follow the advice I give them.	-	.03	-.01	-.11	-.67	.03	.35
It is best to avoid being with people who disagree and argue.	-	-.04	.05	.04	.47	.27	.30
Making friends is not important to me.	+	.03	-.01	-.11	.67	.03	.35

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors from the 65-Item Pilot Hardiness Questionnaire

		Oblique Factor Loading					
Factor V Items	KEY	I	II	III	IV	V	DRI[b]
I dislike work which offers little variety.	-	.01	.25	-.26	-.16	-.28	.20
If I were to take a vacation I would not pick a place that I've never been to before.	-	.12	-.03	.03	.01	.37	.05
People are likely to get hurt if they meet the unexpected.	-	.18	-.01	.14	.13	.54	.36
I do not like conversations where others object to what I am saying.	-	.06	.03	-.01	.11	.37	.30
Fate can prevent a person from becoming a success.	-	.17	.12	-.09	.10	.30	.00
When grocery shopping, I do not like to try different brands of a product.	-	-.15	-.07	-.13	.08	.33	.28
Family demands do not largely determine my life.	+	-.06	.05	-.14	.07	-.31	.05

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index.

Table 5 (Continued)
Moderate to High-Loading Items on Each of the Five Factors from the 65-Item Pilot Hardiness Questionnaire

Factor V Items	KEY[a]	Oblique Factor Loading I	II	III	IV	V	DRI[b]
I don't like things to be uncertain or unpredictable.	-	.03	-.20	.07	.23	.38	.36
I am quick to adopt new ways even though it may mean getting rid of old habits.	+	-.27	.20	.17	.08	-.36	.14
If I did not have friends my life would be dull.	+	-.08	.24	-.21	-.04	.35	.00
Percent of Variance Explained		15.7	4.7	4.0	3.2	3.1	

KEY[a] - = Item negatively keyed, + = Item positively keyed

DRI[b] = Differential Reliability Index

Relationship of Pilot Hardiness Items To Social Desirability

As shown in Table 6, the Differential Reliability Indexes (DRIs) based on Jackson's Social Desirability Scale (JSDS) for 7 (39%) of the Factor I items, 5 (50%) of the Factor II items, 7 (88%) of the Factor III items, 3 (33%) of the Factor IV items and 4 (40%) of the Factor V items are less than .10 indicating that these items are only slightly more correlated with their own scale than they are with the JSDS.

Table 6 presents the intercorrelations among the hardiness factors and social desirability. The commitment (Factor I & III) and the challenge subscales (Factors II & V) are significantly intercorrelated ($r=.39$, $p < .01$ and $r=.20$, $p < .01$ respectively). Cognitive appraisal of challenge (Factor II) is not significantly correlated with either of the commitment scales (Factors I and III). Social desirability was significantly correlated with all five factors particularly the scales assessing commitment to self and work ($r = .61$ $p <.001$), commitment/control in family relationships ($r = .42$, $p < .01$), and commitment/control with respect to friendships ($r = .50$, $p < .01$). The alpha reliability coefficients for challenge appraisal, commitment/control in family relationships, and behavioral challenge are low-

Table 6
Intercorrelations Among the Pilot Hardiness Subscales and Social Desirability

Scale	I	II	III	IV	V	Jackson SD
I Commitment to Self/Work (18 items)	____	.17	.39**	.43**	.34**	.61**
II Challenge Appraisal (10 items)		____	.16	.19*	.20*	.33**
III Commitment/Control Family (8 items)			____	.25**	.25**	.42**
IV Commitment/Control Friends (9 items)				____	.35**	.50**
V Behavioral Challenge (10 items)					____	.34**
VI Jackson Social Desirabililty (20 items)						____
Mean[a]	13.01	6.89	5.84	7.25	7.20	16.22
SD	3.74	1.36	1.74	1.89	2.17	2.76
Range	2-18	3-10	1-8	1-9	2-10	6-20
Alpha Reliability	.84	.57	.60	.72	.57	.66

[a] The higher the score, the lower the level of challenge, commitment, or control.

*p < .05 **p < .001

moderate (.57, .60, .57 respectively).

These results indicate that the pilot hardiness questionnaire is in need of the following revisions 1) the addition of new items in order that control over family and social relations will constitute an empirically distinct factor and thus permit an analysis of the hardiness components, 2) some items should be rewritten to minimize their overlap with social desirability, and 3) the addition of new items which will both improve the internal consistency of the factors especially factors II, III, and V and yield high item loadings on each factor.

Another series of items were written to be administered to the community health nurse sample. Items were retained from the pilot hardiness questionnaire that were relatively factor pure and were more highly correlated with their own scale than with social desirability as evidenced by a DRI > .10. Fifty-two items constituted the final version of the revised hardiness questionnaire that was employed in this prospective-longitudinal study (See Appendix B.3).

Phase II Prospective-Longitudinal Study

Factor Structure of Revised Hardiness Questionnaire

Factor analyses were performed on data obtained at baseline with squared multiple correlations inserted as

communality estimates in the main diagonal. The mean squared multiple correlation was .40. Sixteen factors were extracted with latent roots of 1.64, 1.63, 1.23, 1.11, .88, .75, .72, .61, .58, .52, .48, .46, .41, .41. On the basis of Cattel's Scree Test, 4 factors were retained for oblique rotation and interpretation. As shown in Table 7, 16 items can be associated with Factor I (2 of which load above .5), 10 items with Factor II (1 of which loads above .5), 10 items with Factor III (2 of which load above .5), 6 items with Factor IV (no items load above .5) at baseline assessment. Factor I was defined by positive and negative loadings for items reflecting control in social relationships. Factor II was defined principally by positive loadings for items reflecting lack of challenge, specifically cognitive appraisal and behavioral aspects of challenge. Factor III was defined by positive and negative loadings for items reflecting commitment with respect to self and work. Factor IV was defined principally by negative indicators of control, challenge, and commitment comprising a general negative cognitive-perceptual set.

Factor analyses were performed on hardiness questionnaire data obtained at 3 month followup with squared multiple correlations inserted as communality estimates in the main diagonal. The mean squared

Table 7
Factor Loadings of Items on Each of the Four Factors From the 52-Item Revised Hardiness Questionnaire At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor I Items (Control)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
I doubt whether I can get my family		.59[c]	.03	-.08	.09	.27	.27
to follow my way of doing things.	-	.71	.11	.16	.02	.24	.28
I don't think my friends would		.50	.05	.06	.23	.16	.18
follow the advice I give them.	-	.53	.04	-.11	.13	.19	.20
My friends hardly ever follow		.49	.09	-.00	.15	.17	.19
follow my example.	-	.53	-.03	-.13	.15	.13	.19
I almost never get my family to		.47	-.01	-.16	.14	.17	.19
come around to my way of thinking.	-	.61	.06	.12	.09	.13	.15
My family members take advice		-.47	.05	.22	.11	.16	.19
I give them seriously.	+	-.45	-.06	-.06	-.12	.05	.09
If my family members had to make							
a major decision, they would		-.46	.14	.05	.03	.14	.14
discuss the matter with me first.	+	-.64	.03	-.07	-.02	.09	.10

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor I Items (Control)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
I am not usually able to persuade my friends to change their minds about something.		.41[c]	.15	.22	.11	.08	.01
	-	.46	.23	.10	.00	.07	.10
I'm the person in my family who usually settles arguments.		-.39	.07	.03	.13	.08	.04
	+	-.53	.05	-.01	-.01	.07	.06
I can persuade most of my family members to maintain regular contact with each other.		-.38	.01	.03	.33	.10	.09
	+	-.38	-.04	.04	.12	.08	.08
My family does not rely on me for direction.		.39	-.01	.00	.00	.08	.10
	-	.59	.02	.14	.14	.17	.17
I can usually settle an argument among friends.		-.38	-.10	.05	.17	.08	.04
	+	-.50	-.08	.16	.12	.24	.21
In my family I see to it that things are running smoothly.		-.34	.14	.00	.14	.07	.04
	+	-.46	.14	.14	-.01	.07	.04

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor I Items (Control)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
There is little I can do to		.30[c]	.07	.07	.23	.03	.07
change a friend's mood.	-	.34	.11	-.11	.16	.28	.28
I have difficulty making		.30	.07	.07	.23	.03	.07
myself heard at home.	-	.26	.23	-.01	.13	.02	.10
My friends often come to me		-.25	-.03	.07	.16	.03	.04
when they need help with a task.	+	-.50	.24	.22	-.01	.11	.12
Factor II Items (Challenge)							
I don't like things to be		.11	.50	.00	.04	.18	.19
uncertain or unpredictable.	-	.06	.62	-.07	-.02	.18	.20
I usually don't look forward							
to having to do something at work		.09	.45	.07	.09	.10	.12
that I've never done before.	-	.12	.47	.03	.02	.07	.08

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor II Items (Challenge)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
Unfamiliar situations make me		-.04[c]	.41	-.04	.11	.07	.09
feel uncomfortable.	-	.03	.59	.03	-.01	.11	.11
I can't imagine making any drastic		-.05	.37	.03	.01	.06	.05
changes in my life right now.	-	-.04	.31	-.08	-.03	.04	.05
I do not like conversations where		-.01	.34	.05	.02	.06	.06
others object to what I am saying.	-	.10	.48	.07	.07	.05	.04
I like the idea of living in a		.00	-.33	-.04	.03	.08	.07
foreign country.*	+	.07	-.16	.26	.02	.03	.02
Unexpected demands generally		.04	.31	-.16	.14	.04	.03
pose an inconvenience to me.	-	.01	.47	.05	.17	.05	.10
I like variety in my daily		.01	-.26	.09	.11	.03	.03
routine.*	+	.03	-.16	.59	-.08	.02	.03

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

*Item loads on Factor III at 3 month followup

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor II Items (Challenge)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
If I were to take a vacation, I would probably pick a place that I've never been to before.*		-.05[c]	-.26	.19	.04	.02	.04
	+	.01	-.18	.37	.00	.02	.00
When grocery shopping, I do not like to try different brands of a product.		.07	.25	-.07	.06	.05	.06
	-	.09	.28	-.10	-.06	.02	.03
Factor III Items (Commitment)							
I feel a sense of accomplishment with the way I spend my days.*		-.05	.03	.54	-.15	.04	.15
	+	-.16	-.01	.18	-.42	.06	.04
I have little interest in my work.*		.09	-.09	-.48	.13	.04	.07
	-	.03	.04	-.02	.50	.05	.02

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

*Item loads on Factor IV at 3 month followup

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor III Items (Commitment)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
Most of my work is just too boring		.04[c]	.01	-.35	.17	.03	.05
to be worthwhile.*	-	.10	-.02	-.17	.47	.03	.03
		.07	-.26	.39	.09	.04	.07
I usually enjoy meeting new people.	+	-.07	-.26	.29	-.12	.00	.03
I seldom think about taking early		-.04	.06	.29	.04	.02	.02
retirement from my job.	+	-.09	.01	.00	-.20	.00	.02
I don't mind if people drop by		.09	-.17	.28	.13	.02	.01
to visit me unexpectedly.	+	.07	-.25	.03	-.10	.01	.03
		-.10	.09	.54	.09	.10	.12
I value my work.*	+	-.01	.14	.14	-.48	.04	.04

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

*Item loads on Factor IV at 3 month followup

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor III Items (Commitment)	**Key**	**I**	**II**	**III**	**IV**	**DRIJ[a]**	**DRIMC[b]**
I feel that life is passing me by and that I'm not getting anything out of it.*		.14[c]	.13	-.23	.10	.00	.04
	-	.07	.21	.08	.50	.00	.04
I work mainly because I need the money.		.01	.12	-.22	.15	.05	.05
	-	-.05	.05	-.15	.39	.00	.02
Much of my work day is spent doing things that mean a great deal to others.		-.01	-.06	.21	.07	.02	.02
	+	-.00	.14	.38	-.17	.01	.01
Factor IV Items (Negative Perceptual Set)							
I work hard at my job but it's only the boss who benefits.		.07	.06	-.11	.34	.03	.02
	-	.01	-.02	.09	.59	.10	.13

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

*Item loads on Factor IV at 3 month followup

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor IV Items (Negative Perceptual Set)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
My friends usually expect me to pick a place when we go out for an evening.		-.16[c]	-.11	.02	.31	.00	.00
	+	-.22	.04	.25	.03	.00	.00
Unpredictable situations are not likely to provide opportunities for growth.		.05	-.01	.04	.26	.01	.00
	-	-.05	.04	-.15	.38	.03	.02
The amount of effort you put into your work does not have much to do with whether you will get promoted.		-.04	.17	-.12	.25	.04	.07
	-	.01	-.06	.04	.39	.00	.02
People are likely to get hurt if they meet the unexpected.		-.01	.17	-.00	.24	.00	.00
	-	.09	.25	-.09	.26	.04	.05

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

Table 7 (Continued)
Factor Loadings of Items on Each of the Four Factors
From the 52-Item Revised Hardiness Questionnaire
At Baseline and Three Month Follow-Up

		Oblique Factor Loadings					
Factor IV Items (Negative Perceptual Set)	Key	I	II	III	IV	DRIJ[a]	DRIMC[b]
Much of what happens to me		.17[c]	.18	.06	.22	.00	.01
seems to have little meaning.	-	-.07	.05	-.15	.63	.01	.07
Percent of Variance Accounted For							
Baseline		7.8	3.3	2.4	2.3		
3 Month Follow-up		15.0	4.6	3.6	3.3		
Factor Similarity Index		.98	.95	.72	.86		

[a]Differential Reliability Index using Jackson's Social Desirability scores.

[b]Differential Reliability Index using Marlowe Crown Social Desirability scores.

[c]Values in upper rows represent factor loadings obtained at baseline, values in lower rows represent factor loadings obtained at three month followup.

multiple correlation was .45. Fifteen factors were extracted with the latent roots of 7.97, 2.55, 2.047, 1.848, 1.36, 1.15, .974, .834. .805, .740, .699 .620, .588, .494, .467. On the basis of Cattel's Scree Test 4 factors were retained for oblique rotation and interpretation. As shown on page 6 of Table 7 Factor I and Factor II loadings are quite similar to those obtained at baseline with a Factor Similarity Index of .98 and .95, respectively. However some of the positive factor loadings obtained at baseline for Factor II load on Factor III at three months. The challenge component at the 3 month assessment appeared to split into 2 factors - one consisting of nearly all negative indicators of cognitive appraisal aspects of challenge (factor II); the other has positive loadings whose items reflect aspects of behavioral challenge (see Table 8). Factor IV is defined principally by negative indicators of items reflecting commitment to self and work.

Relationship of Revised Hardiness Questionnaire Items To Social Desirability

At baseline assessment, 8 (53%) of the items loading on Factor I, 8 (80%) of the items loading on Factor II, 9 (90%) of the items loading on Factor III (90%) and 6 (100%) of the items loading on Factor IV

Table 8

Interpretation of Revised Hardiness Questionnaire Factors Extracted At Baseline and Three Month Followup

Factor	Baseline	3 Month Followup
I	Control in Social Relationships	Control in Social Relationships
	8 negative indicators 7 positive indicators	8 negative indicators 7 positive indicators
II	Challenge Appraisal & Behaviors	Challenge-Appraisal
	7 negative indicators 3 positive indicators	7 negative indicators 1 positive indicator
III	Commitment to Self/Work/Social Relationships	Challenge-Behavior
	6 positive indicators 4 negative indicators	6 positive indicators
IV	Negative Cognitive Set	Commitment to self/work
	5 negative indicators 1 positive indicator	8 negative indicators 2 positive indicators

had DRIs less than .10 based upon the JSDS. The Marlowe Crown Social Desirability Scale (MCSDS) yielded a very similar pattern of items with DRIs falling below .10. Seven of the 8 items loading on Factor I with DRIs falling below .10 as assessed by the JSDS also fell below .10 as assessed by the MCSDS. With respect to the remaining factors all the items with DRIs < .10 as assessed by the JSDS also had DRIs < .10 as assessed by the MCSDS. At the three month assessment, 7 (47%) of the items loading on Factor I, 8 (80%) of the items loading on Factor II, 10 (100%) of the items loading on Factor III and 5 (83%) of the items loading on Factor IV had DRIs less than .10 based on the JSDS. Differential Reliability Indexes based upon the MCSDS at the three month followup were different only for Factors I and II where only 4 (27%) and 7 (70%) of the items, respectively, had DRIs less than .10.

The remainder of the results presented assessing the reliability and validity of the revised hardiness questionnaire are based on scale scores obtained from summing the items comprising the scales for control in social relationships, challenge, commitment, and general negative perceptual set as identified in the factor analysis conducted on baseline data.

Table 9 presents the intercorrelations between the factors and social desirability, descriptive

Table 9
Intercorrelations Among the Revised Hardiness Subscales and Social Desirability (SD)

Scale[a]	I	II	III	IV	JSD	MCSD
I. Control in Social Relationships (15 items)	--	.22**[b] .17*	.25** .29**	.16* .29**	.30** .31**	.24** .16**
II. Challenge (10 items)	--	--	.27** .25**	.27** .25**	.26** .23**	.13* .00
III. Commitment (10 items)	--	--	--	.17* .39**	.38** .41**	.24** .28**
IV. Negative Perceptual Set (6 items)	--	--	--	--	.25** .33**	.00 .00
Jackson SD (20 items)	--	--	--	--	--	.31** .34**
Marlowe Crown SD (33 items)						—
Mean[c]	12.17 12.27	5.59 5.75	8.13 8.11	1.12 1.15	17.11 17.16	18.96 19.16
SD	2.74 2.76	2.16 2.04	1.54 1.41	1.01 1.12	2.21 2.37	4.68 5.16
Range	1-14 3-15	0-10 1-10	0-10 3-10	0-5 0-6	8-20 8-20	6-31 5-32
Alpha Reliability	.75 .75	.62 .58	.53 .42	.39 .37	.55 .77	.74 .79
Test-Retest Reliability[d]	.71	.73	.65	.32	.61	.80

a Items comprising scales were derived from the factor analysis of cross-sectional data obtained at baseline assessment.

b Values in upper rows were obtained at baseline assessment (N=378); values in lower rows were obtained at 3 month follow-up (N=267).

c The > the value the > the level of control, challenge, commitment, and negative perceptual set.

d Correlation between baseline and 3 month follow-up assessment.

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

statistics, and reliability coefficients. The hardiness components were significantly intercorrelated. All factors were significantly correlated with the JSDS in a positive direction. The hardiness component that has the highest correlation with social desirability as assessed by the JSDS and MCSDS was commitment at baseline ($r = .38$, $p < .001$, $r = .24$, $p < .01$, respectively) and 3 month assessments ($r = .41$, $p < .01$, $r = .28$, $p < .01$, respectively). Correlations between each of the hardiness components and the JSDS were consistently higher than those observed with the MCSDS. Factor I had acceptable internal consistency ($r=.75$) and test-retest reliability ($r=.71$). The level of internal consistency for Factors II and III fell in the low-moderate range ($r = .58-.62$ and $r = .42-.53$, respectively) whereas the three month stability was more acceptable ($r = .73$ and $r = .65$, respectively). Factor IV had the poorest reliability as evidenced by its internal consistency (coefficient alpha = .37-.39) and test-retest coefficient ($r = .32$).

Relationship of hardiness components to external locus, sensation-seeking, and social support.

As shown in Table 10 the control component is significantly correlated with both global external locus of control, global satisfaction with support received, and perceived reciprocity. The higher the

Table 10
Intercorrelations Among Hardiness Components, External Locus of Control, Sensation-Seeking and Social Support[a]

Scale[b]	External Control	Sensation-Seeking	Global Sat	Net Size	Support Recipro.	Importance of Support
Control	-.21[c]**	.05	.24**	.09	.15**	-.04
	-.20**	.04	.21**	-.05	.06	.05
Challenge	-.17**	.46**	.04	.07	.06	-.02
	-.23***	.49**	.02	.02	-.01	.02
Commitment	-.24**	.10	.22**	.08	.16**	-.05
	-.26**	.12	.17**	.04	.15**	-.09
Negative Perceptual Set	.23**	.17**	.00	.05	.07	.07
	.28**	.09	.09	-.03	.03	.00
Test-Retest Reliability[d]	.75**	.84**	.66**	.53**	.51**	.71**

[a] Social support indexes are global satisfaction with support received (Global Sat), number of persons in the network (Net Size), proportion of network members perceived as reciprocating support (Support Recipro), and perceived importance of support functions.

[b] The > the value the > the level of control, challenge, commitment, and negative cognitive perceptual set

[c] Values in upper rows were obtained at baseline assessment (N = 361-364); values in lower rows were obtained at 3 month follow-up (N = 248-254).

[d] Correlation between baseline and 3 month followup assessment.

* $p < .05$

** $p < .01$

level of control in social relationships, the lower the level of external locus of control and the higher the level of global satisfaction with social support, at baseline and followup assessments. The control scale was also positively correlated with perceived reciprocity in primary social network relationships but reached statistical significance only at the baseline assessment ($r = .15$, $p < .01$). Challenge is more highly correlated with sensation-seeking ($r = .46$ -.49 $p < .01$) than it is with global external control ($r =$ -.17 to -.23, $p < .01$) or any of the social support indexes ($r = 0$). Commitment is negatively correlated with external locus of control ($r = -.24$ to -.26, $p <$ .01) and positively correlated with two indexes of social support - global satisfaction ($r = .17$-.22, $p <$ .01) and perceived reciprocity ($r = .15$ - .16, $p <$ .01). Negative perceptual set is positively correlated with external control at both assessment points ($r =$ .23 - .28, $p < .01$) and inversely correlated with sensation-seeking at baseline assessment only ($r =$ -.17, $p < .01$). Negative perceptual set is unrelated to any of the social support indexes.

Descriptive Statistics for Stress, Hardiness, Strain, and Illness

Appendix D contains descriptive statistics for

selected study variables and Appendix E lists the frequency of endorsement of the individual life events. The most frequently reported life events occurred within the occupational category. A substantial number of respondents at the baseline and three month assessment endorsed significant success at work (69% and 45%), excessive paper work (71% and 58%), excessive workload upon returning to work after taking days off (60% and 45%), and lack of reliable ancillary patient services (52% and 37%). The least frequently cited events occurred within the categories of marriage, family, and crime and legal matters. The stress, hardiness, and strain measures demonstrated variability and approximated a normal distribution. Although there was considerable variability in the number of physical symptoms reported (1-38), the weighted physical illness score was highly skewed at the baseline (3.54) and three month assessment (2.44). The log transformation of this variable was employed in the subsequent statistical analysis because it more closely approximated a normal distribution (skewness = -.70 at baseline and -.69 at three months).

Relationship of Life Events, Network Stress, Hardiness, Strain, and Illness

Table 11 presents the intercorrelations among the

Table 11
Intercorrelations Among Life Events, Network Stress, Hardiness Composite, Hardiness Components, Strain, and Illness at Baseline and Three Month Followup

	2	3	4	5	6	7	8	9	10	11	12
1. Life Events	.14**	.01	.06	.01	.09	.05	.00	.04	.03	.21**	.17**
	.08	.01	.07	-.14*	.05	.06	-.07	-.01	-.02	.15**	.24**
2. Network Stress	—	.06	.09	-.07	.09	.10	.00	.02	.05	.19**	.19**
		.01	.15	-.01	.05	.12	.00	.11	-.02	.06	.20**
3. Control (CON)		—	.22**	.25**	-.16**	.75**	.82**	.28**	.69**	-.05	-.06
			.17**	.29**	-.25**	.74**	.84**	.26**	.69**	.00	-.12*
4. Challenge (CHAL)			—	.27**	-.25**	.81**	.30**	.86**	.74**	-.13*	-.11*
				.25**	-.16*	.78**	.25**	.87**	.71**	-.10	-.11
5. Commitment (COM)				—	-.17**	.33**	.76**	.72**	.68**	-.18**	-.20**
					-.38**	.36**	.76**	.70**	.69**	-.15**	-.11
6. Negative Perceptual Set					—	-.27**	-.21**	-.28**	-.29**	.09	.10*
						-.26**	-.37**	-.30**	-.35**	.14*	.11
7. CON + CHAL						—	.70**	.76**	.92**	-.13*	-.12*
							.70**	.76**	.92**	-.05	-.14*
8. CON + COM							—	.62**	.86**	-.14*	-.17*
								.57**	.86**	-.07	-.14*
9. CHAL + COM								—	.89**	-.20**	-.19*
									.88**	-.14*	-.12*
10. CON + CHAL + COM									—	-.18*	-.18*
										-.10	-.14*
11. Strain										—	.54**
											.51**
12. Illness											—

Note: Numbers in upper rows represent values obtained on baseline cross-sectional data (N=342-378); numbers in lower rows represent values obtained on cross-sectional data obtained at 3 months (N = 227-266)

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

variables used in the stress-buffering regression analyses at baseline and three months. Life events was positively correlated with network stress at the baseline assessment ($r = .14$, $p < .01$) but failed to reach statistical significance at the 3 month assessment ($r = .08$). Life events was not significantly correlated with any of the hardiness components at the baseline assessment. However, at the three month followup, life events was minimally related to commitment indicating that subjects scoring high in life events had a lower level of commitment ($r = -.14$, $p < .05$). Life events was positively associated with strain and illness both at baseline ($r = .21$, $p < .01$, $r = .17$, $p < .01$, respectively) and 3 month assessments ($r = .15$, $p < .01$ and $r = .24$, $p < .01$).

Network stress was positively correlated with strain at baseline ($r = .19$, $p < .01$) and illness at both baseline ($r = .19$, $p < .01$) and 3 month assessments ($r = .20$, $p < .01$). Network stress was not related to any of the hardiness components either at baseline or 3 month assessments. Control was unrelated to strain and inversely correlated with physical illness at 3 months ($r = -.12$, $p < .09$). Challenge was inversely related to strain ($r = -.13$, $p < .05$) and physical illness only at the baseline assessment ($r = -.11$, $p < .05$). The higher the level of commitment the

lower the levels of strain ($r = -.18$, $p < .01$ at baseline, $r = -.15$, $p < .01$ at 3 months) and physical illness ($r = -.20$, $p < .01$ at baseline). Negative perceptual set was unrelated to life events and network stress and inversely related to strain at 3 months ($r = -.14$, $p < .05$) and illness at baseline ($r = -.10$, $p < .05$). The combination of control, challenge, and commitment was negatively correlated with strain at baseline ($r = -.18$, $p < .05$) and physical illness both at baseline ($r = -.18$, $p < .05$) and 3 months ($r = -.14$, $p < .05$) - the magnitude of these correlations approximated that obtained for commitment. Strain and illness were positively correlated both at baseline ($r = .54$, $p < .01$) and 3 month followup assessments ($r = .51$, $p < .01$).

Hardiness, Total and Components as Buffers of the Stress-Strain Relationship

Table 12 presents the results of two sets of regression analyses; one set performed on cross-sectional data collected at baseline; and the second set employed a prospective-longitudinal model in which variables obtained at baseline (life change, network stress, hardiness composite or components, and respective interaction terms) were used to predict strain at three months. The hardiness measure employed

Table 12
Strain Regressed on Life Events, Network Stress, Personality and Interaction Terms

	Incremental R^2		Incremental F		Beta	
Model	BL[a]	PL[b]	BL	PL	BL	PL
Life Events (LE)	.05	.03	17.1	7.3	.22	.17
Network Stress (NS)	.03	.01	11.3	1.6	.18	.21
Hardiness Composite (HC)	.04	.04	15.6	10.3	-.21	-.20
LE/HC Interaction	.00	.00	.1	.1	NS[c]	NS
NS/HC Interaction	.00	.00	.0	.3	NS	NS
Total	.12	.08				
LE	.05	.03	18.5	7.5	.23	.18
NS	.04	.00	12.5	1.5	.19	NS
Control + Challenge (COCH)	.00	.02	11.2	5.6	-.17	-.15
LE/COCH Interaction	.00	.00	.1	.0	NS	NS
NS/COCH Interaction	.00	.00	.1	.1	NS	NS
Total	.12	.05				
LE	.05	.03	17.2	7.4	.22	.18
NS	.03	.00	11.6	1.5	.18	NS
Control + Commitment (COCM)	.03	.03	9.5	8.0	-.16	-.18
LE*COCM Interaction	.00	.01	1.1	1.5	NS	NS
NS*COCM Interaction	.00	.00	.0	.2	NS	NS
Total	.11	.07				
LE	.05	.03	17.7	7.1	.22	.17
NS	.03	.00	11.4	1.1	.18	NS
Challenge + Commitment (CHCM)	.04	.04	16.1	9.7	-.21	-.20
LE*CHCM	.00	.01	1.3	1.6	NS	NS
NS*CHCM	.00	.00	.3	1.5	NS	NS

[a] Analysis of cross-sectional data obtained at baseline assessment (N=332).

[b] Measures of predictor variables obtained at baseline, strain assessed at 3 month followup (N = 239).

[c] NS = Nonsignificant. Note Beta values not listed as NS are significant at $p < .05$.

Table 12 (Continued)
Strain Regressed on Life Events, Network Stress, Personality and Interaction Terms

	Incremental R^2		Incremental F		Beta	
Model	BL[a]	PL[b]	BL	PL	BL	PL
Life Events (LE)	.05	.03	18.5	8.1	.23	.18
Network Stress (NS)	.04	.01	12.6	1.6	.19	NS[c]
Control (CON)	.01	.01	2.6	1.7	NS	NS
LE*CON	.01	.01	3.3	3.8	NS	NS
NS*CON	.00	.00	.6	0.0	NS	NS
Total	.11	.06				
LE	.05	.03	18.7	6.9	.23	.17
NS	.04	.01	16.3	1.3	.19	NS
Challenge (CHAL)	.03	.02	9.9	4.2	-.16	-.13
LE*CHAL	.00	.01	.8	1.9	NS	NS
NS*CHAL	.00	.00	.0	.1	NS	NS
Total	.12	.07				
LE	.05	.03	17.8	7.5	.22	.17
NS	.03	.01	11.2	1.3	.18	NS
Commitment (COM)	.03	.03	10.8	8.6	-.17	-.18
LE*COM	.00	.00	.4	.2	NS	NS
NS*COM	.00	.01	.5	4.4	NS	NS
Total	.11	.08				
LE	.05	.03	18.6	7.4	.23	.17
NS	.03	.01	12.6	2.1	.19	NS
Factor IV	.01	.01	5.5	3.7	-.12	NS
LE*Factor IV	.01	.02	4.4	5.2	NS	.50
NS*Factor IV	.00	.00	.7	.9	NS	NS
Total	.09	.08				

[a] Analysis of cross-sectional data obtained at baseline assessment (N=332).

[b] Measures of predictor variables obtained at baseline, strain assessed at 3 month followup (N = 239).

[c] NS = Nonsignificant. Note Beta values not listed as NS are significant at $p < .05$.

in the models include either the composite (combination of challenge, commitment, and control), combinations of two of the components, the individual components or the general factor (i.e. negative perceptual set). With respect to the cross-sectional analyses performed at baseline and and the prospective-longitudinal models, a significant positive main effect was consistently obtained for life events. A significant main effect for network stress on strain was evident only at the baseline assessment. There was a main effect for the hardiness composite, combinations of control and commitment, challenge and commitment, and commitment alone. There was no significant interaction effect for any of the combinations of hardiness or any of the individual components.

Factor IV was the only factor to interact with life events on strain in the prospective-longitudinal model. This interaction effect was weak as it accounted for only two percent of the variance after the main effects for life events, network stress, and Factor IV were entered into the model. In order to examine the nature of this interaction effect respondents at baseline assessment were classified as high or low in level of life events and negative perceptual set by means of a median split. The results of analysis of variance and Scheffe tests indicated that subjects who were both low

in level of readjustment and low in level of negative perceptual set exhibited significantly less strain than either subjects who were either both high in adjustment and low in negative perceptual set or those subjects who were high in both readjustment and negative perceptual set ($F = 4.26$, $P < .01$). Subjects in the high life events group who were high scorers on the negative cognitive perceptual set factor exhibited higher levels of strain than those who were low on this factor however this effect failed to reach statistical significance.

Hardiness Total and Components as Buffers of the Stress-Physical Illness Relationship

Table 13 presents the results of physical illness regressed on life events, network stress, hardiness components, and their respective interaction terms. A reliable, concurrent, and prospective positive association was demonstrated for life events, and network stress on illness. A consistent main effect for hardiness was evident for 1) the composite term, 2) combinations of control, challenge, and commitment and 3) commitment alone. The hardiness composite or component effect accounts for only two to four percent of the variance in illness after life events and network stress are entered into the model. No

Table 13
Physical Illness Regressed on Life Events, Network Stress, Personality and Interaction Terms

Model	Incremental R^2 BL[a]	Incremental R^2 PL[b]	Incremental F BL	Incremental F PL	Beta BL	Beta PL
Life Events (LE)	.04	.02	13.7	5.5	.20	.15
Network Stress (NS)	.02	.03	8.2	6.6	.15	.17
Hardiness Composite (HC)	.04	.03	15.6	7.2	-.21	-.17
LE/HC Interaction	.01	.00	2.1	.1	NS[c]	NS
NS/HC Interaction	.00	.01	.2	1.3	NS	NS
Total	.11	.09				
LE	.04	.02	14.1	5.6	.20	.15
NS	.02	.03	8.6	6.1	.16	.17
Control + Challenge (COCH)	.02	.02	8.6	4.6	-.16	-.14
LE/COCH Interaction	.00	.00	1.4	.2	NS	NS
NS/COCH Interaction	.00	.00	.0	.5	NS	NS
Total	.08	.07				
LE	.04	.02	13.4	5.4	.20	.15
NS	.02	.03	7.9	6.8	.15	.17
Control + Commitment (COCM)	.03	.03	11.4	7.8	-.18	-.18
LE*COCM Interaction	.00	.01	.9	.6	NS	NS
NS*COCM Interaction	.00	.00	.0	.5	NS	NS
Total	.09	.08				
LE	.04	.02	13.5	5.6	.20	.15
NS	.02	.03	8.6	7.5	.16	.18
Challenge + Commitment (CHCM)	.04	.02	16.0	4.7	-.21	-.14
LE*CHCM	.01	.00	2.5	.4	NS	NS
NS*CHCM	.00	.00	.2	.8	NS	NS
Total	.11	.07				

[a] Analysis of baseline cross-sectional data (N = 326).

[b] Measures of predictor variables obtained at baseline, physical illness assessed at 3 month followup (N = 230).

[c] NS = Nonsignificant. Note Beta values not listed as NS are significant at $p < .05$.

Table 13 (Continued)
Physical Illness Regressed on Life Events, Network Stress, Personality and Interaction Terms

	Incremental R^2		Incremental F		Beta	
Model	BL[a]	PL[b]	BL	PL	BL	PL
Life Events (LE)	.04	.02	14.0	5.6	.20	.15
Network Stress (NS)	.02	.03	8.4	6.6	.16	.17
Control (CON)	.01	.02	2.5	4.1	NS[c]	-.13
LE*CON	.00	.00	.5	.9	NS	NS
NS*CON	.00	.00	.2	.0	NS	NS
Total	.07	.07				
LE	.04	.02	13.3	5.7	.20	.15
NS	.03	.03	9.6	7.6	.17	.18
Challenge (CHAL)	.02	.00	7.1	.4	-.14	NS
LE*CHAL	.00	.00	2.5	.8	NS	NS
NS*CHAL	.00	.00	.0	.1	NS	NS
Total	.09	.05				
LE	.04	.02	13.4	5.8	.19	.16
NS	.02	.03	8.8	8.4	.16	.19
Commitment (COM)	.04	.02	14.1	5.2	-.20	-.14
LE*COM	.00	.00	.1	.0	NS	NS
NS*COM	.00	.00	.0	.8	NS	NS
Total	.10	.07				
LE	.04	.02	13.2	5.7	.19	.15
NS	.03	.03	9.1	7.6	.16	.18
Factor IV	.02	.00	8.3	.5	-.15	NS
LE*Factor IV	.00	.00	.9	.1	NS	NS
NS*Factor IV	.00	.00	1.1	1.2	NS	NS
Total	.09	.06				

[a] Analysis of baseline cross-sectional data (N = 326).

b Measures of predictor variables obtained at baseline, illness assessed at 3 month followup (N = 230).

[c] NS = Nonsignificant. Note Beta values not listed as NS are significant at $p < .05$.

significant interaction effect was found for the life event-hardiness, network stress-hardiness interaction terms in any of the baseline, or prospective-longitudinal models tested.

Personality Components Required For The Hardiness-Strain Relationship And Hardiness-Illness Relationship

In order to determine whether all three personality components are essential to the hardiness-strain and hardiness-illness relationships, two sets of hierarchical multiple linear regressions were performed with strain (See Table 14) and illness (See Table 15) regressed on control, challenge, and commitment first entered into the equation followed by the two-way interaction terms (control*challenge, control*commitment, and challenge*commitment) and the three-way interaction term (control*challenge*commitment) on cross-sectional data obtained at baseline. Prospective-longitudinal models incorporated baseline measures of hardiness as predictors of strain at 3 months. A significant, unique contribution was made by commitment in explaining the variance in strain at the baseline assessment and in the prospective-longitudinal model. Similar results were obtained when physical illness was regressed on the hardiness components and interaction terms - commitment

Table 14
Strain Regressed on Commitment, Control, Challenge, Two-Way and Three-Way Interaction Terms

Variable Sets	Incremental R^2 BL[a]	Incremental R^2 PL[b]	Incremental F BL	Incremental F PL	Beta at Set Entry BL	Beta at Set Entry PL
1. Control (CON)					NS[c]	NS
Challenge (CHAL)					NS	NS
Commitment(COM)					-.149**	-.171**
SET TOTAL	.042	.042	5.296	3.765		
2. CON*CHAL						
CON*COM						
CHAL*COM						
SET TOTAL	.008	.013	1.004	1.227	NS	NS
3. CON*CHAL*COM	.001	.000	.194	.010	NS	NS
	.051	.055				

[a] Analysis of baseline cross-sectional data (N = 378).

b Predictor variables obtained at baseline, strain obtained at 3 month followup.

[c] NS = Nonsignificant.

** $p < .01$

Table 15
Physical Illness Regressed on Commitment, Control, Challenge, Two-Way and Three-Way Interactions

Variable Sets	Incremental R^2 BL[a]	Incremental R^2 PL[b]	Incremental F BL	Incremental F PL	Beta at Set Entry BL	Beta at Set Entry PL
1. Control (CON)					NS[c]	NS
Challenge (CHAL)					NS	NS
Commitment(COM)					-.185**	NS
SET TOTAL	.046	.027	5.910	2.333		
2. CON*CHAL						
CON*COM						
CHAL*COM						
SET TOTAL	.000	.001	.090	.137	NS	NS
3. CON*CHAL*COM	.000	.000	.264	.011	NS	NS
	.046	.028				

[a] Analysis of baseline cross-sectional data (N = 378).

b Predictor variables obtained at baseline, physical illness obtained at 3 month followup.

[c] NS = Nonsignificant

** $p < .01$

was the only hardiness component making a significant unique contribution in explaining the variance in illness. In both instances, the higher the level of commitment the lower the level of strain and illness.

In the analyses reported above, commitment was found to exert a weak effect on health outcomes. To assess whether the prediction of mental strain and physical illness could be improved, a subset of items were selected from the hardiness questionnaire which had substantial factor loadings. Appendix F contains the subset of items and their factor loadings that were obtained at the baseline assessment. At the baseline assessment, six items were chosen for the control scale (alpha coefficient = .70) and four items for the challenge scale (alpha coefficient = .52). Five items were chosen from the commitment scale. As the commitment scale was extremely skewed (skewness = -3.4), a dichotomous variable was created and dummy coded so that subjects received a score of 1 if they endorsed all items or zero if they did not endorse all items. The results of regression analyses conducted with the abridged scales for control and challenge and the commitment variable did not result in any greater prediction of mental strain or physical illness at baseline than that observed with the longer scale versions.

Coping and Social Support as Buffers of the Stress-Strain and Stress-Illness Relationships

A series of regression analyses were performed to test for stress-buffering effects of coping and social support (global satisfaction with social support received) with strain and physical illness as the outcome measures on cross-sectional data obtained at baseline and in a prospective-longitudinal model. No personal life events or network stress buffering effects were obtained for either coping or social support.

Relationship Between Background Characteristics, Commitment, Coping, Social Support and Strain

Although the amount of variance in strain at three months that was explained by the hardiness components was only 4.2%, multivariate statistical analyses examining the nature of the interrelationships between background characteristics, commitment, coping social support, and strain were performed for heuristic purposes to examine whether the pattern of interrelationships was consistent with the hardiness model of stress resistance. Commitment was the hardiness component selected for analysis because it made a significant unique contribution to the variance in strain.

Path analyses were conducted to determine 1) to what extent commitment, in accordance with an existential formulation, exerted both direct and indirect effects on strain through social support and coping and 2) whether the relationship between commitment and strain at 3 months exhibited in the prospective-longitudinal model described above is maintained when controlling for relevant background variables. In order to determine what background variables should be included in the patn analysis zero order correlations between sociodemographic variables, employment related characteristics, and strain were examined.

The sociodemographic variables that were significantly related to strain at 3 month followup included genetic risk ($r = .15$, $p < .01$) , college education ($r = -.17$, $p < .01$), and age ($r = -.14$, $p < .01$, see Table 16). The nature of these correlations indicated that having a family history of illness and no college education, and being younger in age was positively associated with strain. The only employment related variable that was significantly related to strain at 3 months was care of the terminally ill. Subjects who cared for terminally ill patients exhibited higher levels of strain than those who did not provide such care ($r = .14$, $p < .05$).

Table 16
Intercorrelations Among Sociodemographic Characteristics, Strain, and Illness

	2	3	4	5	6	7	8	9
1. MSTAT[a]	-.03 (380)[b]	-.05 (388)	.00 (388)	.43 (388)	.04 (382)	-.01 (277)	-.02 (381)	-.04 (271)
2. RISK[c]		-.06 (380)	-.07 (380)	-.08 (380)	.20** (375)	.15** (274)	.15** (374)	.19** (268)
3. EDL[d]			-.05 (388)	-.08 (388)	-.14** (382)	-.17** (277)	-.14** (381)	-.17** (271)
4. AGE				.21** (388)	-.18** (382)	-.14** (277)	-.02 (381)	-.00 (271)
5. CHILD[e]					-.11* (382)	-.07 (277)	-.03 (381)	-.02 (271)
6. STRAIN-Baseline						.67** (272)	.54** (277)	.48** (272)
7. STRAIN-3 Months							.67** (272)	.51** (272)
8. ILLNESS-Baseline								.66** (266)
9. ILLNESS-3 Months								—

[a] Marital status, dummy coded, married vs. not (MSTAT).

[b] Numbers in parentheses represent number of subjects.

[c] Genetic Risk, dummy coded, risk vs. not (RISK).

[d] Level of education, dummy coded, college vs. none (EDL).

[e] Number of children, dummy coded, children vs. none (CHILD).

* $p < .05$

** $p < .01$

Path analyses were performed incorporating sociodemographic and employment related variables that were significantly correlated with strain at 3 months. Health practices at 3 month assessment were included in the path models. The results of a factor analysis (see Appendix G.1) revealed that health practices at 3 months could be reduced to 4 factors. These consisted of a positive health practices factor (monitor diet, reduce alcohol, and get physical exams), and a negative health practices factor (overeating and regularly sleeping less than 8 hours per night). Scores for each of these two factors were calculated by summing up the total number of health practice items endorsed. Minimizing vigorous physical activity and smoking loaded on separate factors. Since positive health practices and smoking were unrelated to level of strain at 3 months they were not entered into the path analyes.

Life readjustment was included in the path models as prior analyses indicated it was significantly related to strain. Table 17 presents the intercorrelations among all the variables used in the path analytic models assessing relationships between sociodemographic and employment related variables, life events, commitment, coping, social support, health practices, strain at baseline and at 3 month followup.

Table 17
Intercorrelations Among Variables Used in Strain Path Analyses

		2	3	4	5	6	7	8	9	10	11	12
1.	Risk	.06	.07	.21**	.10	.05	-.03	.10	.11	.07	.20**	.15**
2.	EDL	___	.05	.00	.02	.07	.01	.01	.09	.07	-.14**	-.17**
3.	AGE		___	-.17**	-.20**	.09	.15**	.13*	.04	.18**	-.18**	-.14*
4.	TERM-ILL			___	.06	.06	.00	.00	.05	.08	.07	.14*
5.	LE-BL				___	.01	.00	-.17**	.13*	-.08	.21*	.18**
6.	COMMITMENT					___	.35**	.19**	.02	.01	-.18**	-.17**
7.	COPING						___	.19**	-.09	-.17**	-.22**	-.23**
8.	SOCIAL SUPPORT-3M							___	-.08	-.06	-.15*	-.16*
9.	NEG HEALTH PRACTICES-3M								___	.16**	.21**	.27**
10.	PHYSICAL INACTIVITY-3M									___	.20**	.24**
11.	STRAIN										___	.67**
12.	STRAIN-3M											___

Note: Genetic risk dummy coded as risk vs. none (RISK), level of education coded as college vs. none (EDL), care of terminally ill coded as care vs. none (TERM-ILL), LE = Life Events; unless otherwise indicated by 3M (3 month assessment) values were obtained at baseline (N=257).

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

Genetic risk of illness was positively related to care of the terminally ill ($r = .21$, $p < .01$). The older a subject was the less likely he or she was to be employed in the care of terminally ill patients ($r = -.17$, $p < .01$), and experience major life events ($r = -.20$, $p < .01$). Age was positively associated with the following: 1) coping ($r = .15$, $p < .01$), 2) global satisfaction with support received ($r = .13$, $p < .05$) and 3) minimizing vigorous physical activity ($r = .18$, $p < .01$).

Life readjustment was positively correlated with negative health practices ($r = .13$, $p < .05$). Commitment was positively correlated with coping ($r = .35$, $P < .01$) and satisfaction with social support received ($r = .19$, $p < .01$). Commitment was not related to any measure of health practices. Transformational-like coping was positively related to global satisfaction with social support at three months ($r = .19$, $p < .01$) and inversely correlated with minimizing vigorous physical activity ($r = -.17$, $p < .01$). Social support was unrelated to health practices. Negative health practices at 3 months were positively related to minimizing physical activity ($r = .16$, $p < .01$) and level of concurrent strain ($r = .27$, $p < .01$). Minimizing physical activity at three

months was inversely related to smoking ($r = -.12$, $p < .05$) and positively related to level of concurrent strain ($r = .24$, $p < .01$). Relative to other correlates, strain at baseline was highly correlated with strain at 3 month followup ($r = .67$, $p < .001$).

Path analyses were conducted to assess the effects of education (no college vs. college), age, care of the terminally ill, life events (baseline), commitment, coping, negative health practices, and minimizing vigorous physical activity on strain at 3 months. Figure 3 illustrates the trimmed path model containing those variables with path coefficients significant at $p < .06$. Taking care of the terminally ill, life events at baseline, and negative health practices were positively correlated with mental strain. Life events significantly affected mental strain directly and to a lesser extent indirectly through its negative impact on social support (see Table 18). There was a trend for commitment to affect strain directly and indirectly through its positive effect on social support. The total amount of variance accounted for in mental strain by these variables is 17.2%. Negative health practices accounts for the single largest source of the variance explained. Care of the terminally ill, life events, and commitment make a significant unique contribution to the variance, whereas the effect for social support is

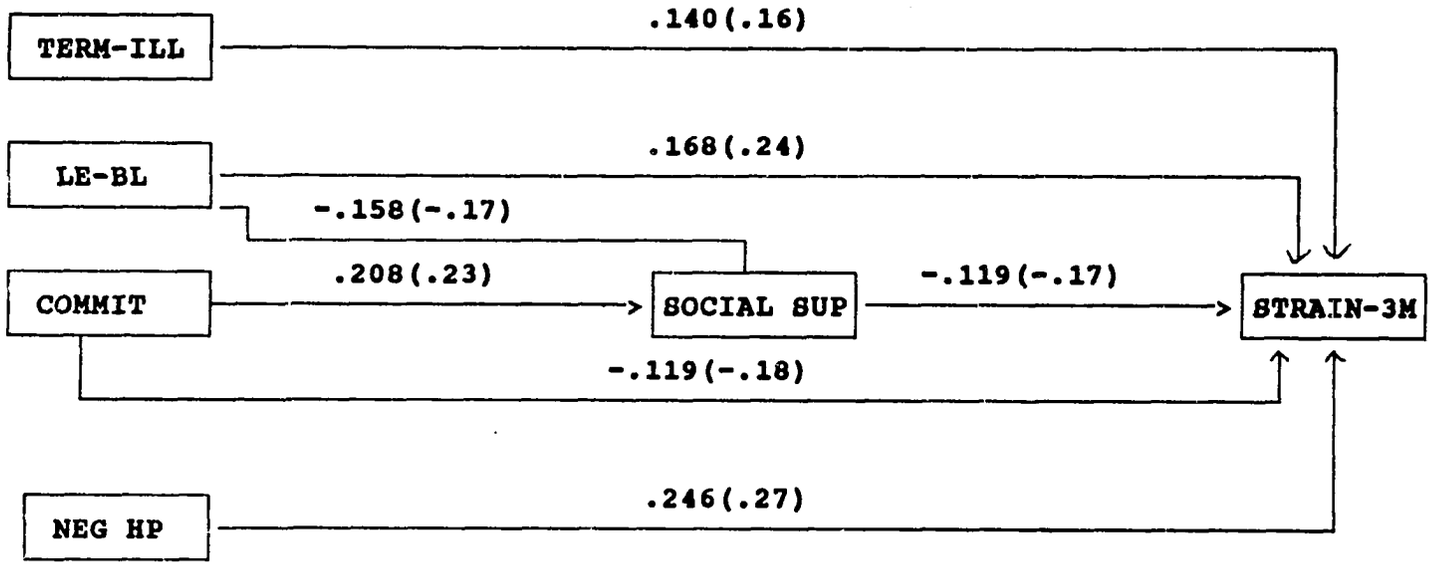

Figure 3 Path Model of Relationships Between Strain at three months and Care of Terminally Ill (Care vs. Not, TERM-ILL), Life Events at Baseline (LE-BL), Commitment (COMMIT), Negative Health Practices at 3 months (NEG HP), and global satisfaction with social support at 3 months (SOCIAL SUP). All path coefficients are significant at $p < .05$ except for commitment and social support ($p < .06$). Numbers in parentheses are zero order correlations.

Table 18
Decomposed Correlations For Strain Path Model and Amount of Variance Explained by Predictor Variables

Variables	Direct Effect	Indirect Effect	Total Effect
Life Events	.168	.019	.187
Commitment	-.119	-.025	-.144
	Amount of Variance Explained		
Care of Terminally ill		.027***	
Life Events		.048***	
Commitment		.022**	
Social Support[1]		.015*	
Neg Health Practices[2]		.059***	
	Total	.172	

[1]Global satisfaction with social support received at 3 months.

[2]Negative Health Practices assessed at 3 months include overeating and regularly sleeping less than 8 hours per night.

*p < .06

**p < .05

***p < .001

marginal. When baseline level of strain was included in the model, it explained 51% of the variance in strain at 3 months. The 17.2% of the variance explained in strain at discussed above was obscured by the common variance shared between the baseline and three month strain measures. Therefore the baseline measure of strain was excluded from the path model.

Relationship of Background Characteristics, Stress, Commitment, Coping, Social Support, and Physical Illness

Personal background characteristics that were significantly related to illness included genetic risk ($r = .15$, $p < .01$) and level of education ($r = -.14$, $p < .01$). Being at genetic risk for illness was positively related to illness whereas having had a college education was associated with a lower level of illness. No employment related characteristics were significantly related to baseline physical illness. Baseline health practices chosen for inclusion in the path analysis models were derived from the results of a factor analysis (see Appendix G.2). Positive health practices was scored by summing the responses to three health practices-reduce alcohol, monitor diet, and get physician exams. Two health practice items were entered in separately - taking vitamins (versus not)

and regularly sleeping less than 8 hours per night (vs. not). The negative health practices score was calculated by summing the responses to 2 items - overeating and minimizing vigorous physical activity.

Table 19 presents the intercorrelations among variables used in path analyses of illness at baseline. College education was positively related to negative health practices ($r = .17$, $P < .01$) and to a lesser extent vitamin taking ($r = .13$, $p < .01$). Life events were positively related to network stress ($r = .14$, $p < .01$) and inversely related to social support ($r = -.12$, $P < .05$). Network stress was inversely correlated with social support ($r = -.12$, $p < .05$). Commitment was positively related to social support ($r = .22$, $P < .01$) and coping ($r = .35$, $p < .01$). Commitment was not related to any measure of health practices. Social support was positively correlated with coping ($r = .26$, $p < .01$) and inversely correlated with negative health practices ($r = -.16$, $p < .01$). Coping was inversely correlated with negative health practices ($r = -.14$, $p < .01$). Negative health practices was most highly correlated with physical illness ($r = .40$, $p < .01$).

It should be noted that only 4.6% of the variance in physical illness was explained by the hardiness components. Nevertheless, path analyses were conducted for heuristic purposes to examine the nature of the

Table 19
Intercorrelations Among Variables Used in Path Analysis of Illness at Baseline (N = 351)

	2	3	4	5	6	7	8	9
1. EDL[a]	-.02	-.01	.07	-.01	.01	.17**	.13**	.14**
2. Life Events		.14**	.01	-.12*	.00	.09	-.03	.17**
3. Net Stress			.07	-.12*	-.07	.04	.09	.19**
4. Commitment				.22**	.35**	.08	.07	-.20**
5. Social Support					.26**	-.16**	.01	-.19**
6. Coping					___	-.14**	.04	-.22**
7. Neg HP						___	-.15	.40**
8. Take Vitamins							___	.11*
9. Physical Illness								___

[a] Level of education, dummy coded, college vs. none (EDL).

* $p < .05$

** $p < .01$

interrelationships between background characteristics, stress, commitment, coping, social support, and illness. Commitment was the hardiness component selected for analysis because it made a significant unique contribution to illness at the baseline assessment.

Figure 4 presents the trimmed path model in which variables have significant path coefficients ($p < .05$). Life events, network stress, and negative health practices were positively related to illness. Commitment and coping were inversely related to illness. Commitment affected illness both directly and to a lesser extent indirectly through it's effect on coping. As shown in Table 20, the combination of these variables account for 25% of the variance in illness with negative health practices making the single largest unique contribution followed by life events, coping, and network stress.

Relationship of Commitment to Absenteeism and Health Care Utilization

A series of analyses of variance tests were performed to determine whether subjects missing days from work due to illness, making visits to a physician and making use of health care services during the past 6 month period differed in their level of commitment. At baseline assessment subjects who did not miss any

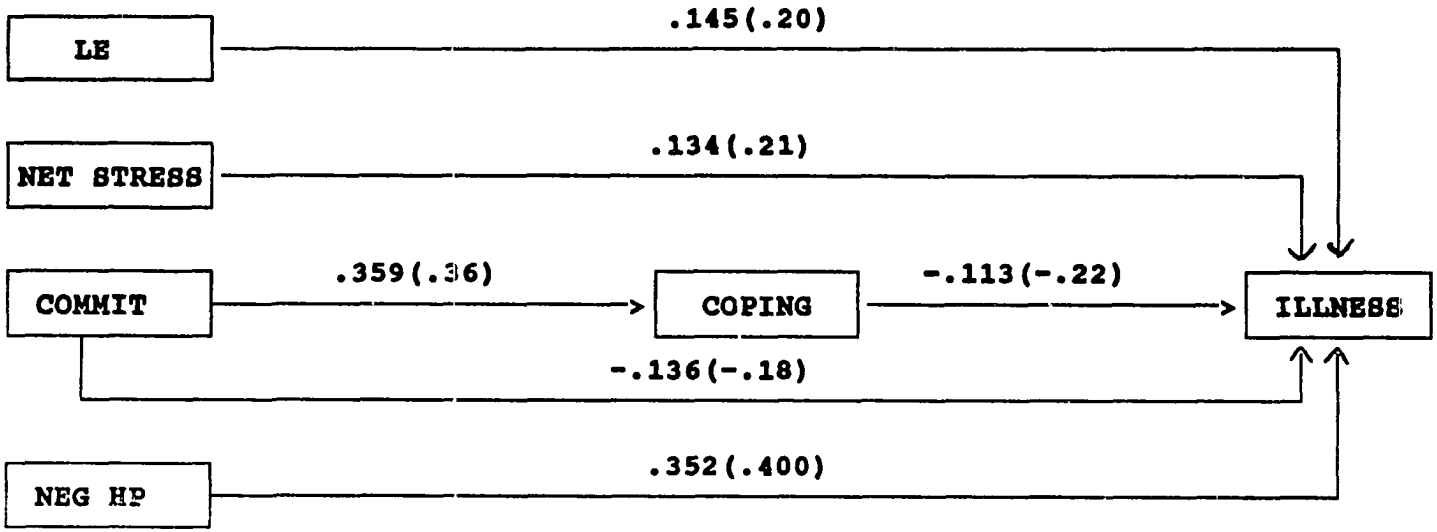

Figure 4 Path Model of Relationships Between Physical Illness Life Events (LE), Network Stress (NET STRESS), Commitment (COMMIT), Negative Health Practices (NEG HP), Coping at Baseline Assessment. All path coefficients are significant at $p < .05$. Numbers in parentheses are zero order correlations (N = 305).

Table 20
Decomposed Correlations For Illness Path Model And Amount of Variance Explained By Predictor Variables

Variable	Direct Effect	Indirect Effect	Total Effect
Commitment	-.136	-.044	-.180
	Amount of Variance in Illness Explained		
Life Events		.042***	
Network Stress		.024***	
Commitment		.041***	
Coping		.025**	
Negative Health Practices		.118***	
Total		.250	

[1] Negative health practices include overeating and minimizing physical activity.

* $p < .05$

** $p < .01$

*** $p < .001$

days from work due to illness had significantly higher levels of commitment than subjects who missed 1-2 days or those who missed 3 or more days ($F = 9.81$, $p < .0001$). Subjects who did not make use of any health services exhibited higher levels of commitment than subjects making 1-2 visits or those making 3 or more visits ($F = 3.36$, $p < .05$). Subjects making no visits to a physician had higher levels of commitment than those making 1 visit or those making more than 1 visit ($F = 4.08$, $p < .01$). Subjects who reported not missing any days from work due to illness at the three month assessment were higher in commitment (baseline level) than those subjects who missed 1-2 days or those missing 3 or more days ($F = 5.67$, $p < .001$).

CHAPTER V

DISCUSSION

The objective of this study was to develop an instrument containing empirically distinct measures of the hardy personality components and to determine whether the relationship between environmental stress, hardiness, social support, coping and health supported Kobasa's theoretical model of stress resistance.

As expected, results indicated that the revised hardiness questionnaire could be reduced to three empirically distinct dimensions corresponding to commitment, challenge, and control. With the exception of the control dimension the challenge and control components had weak psychometric properties as demonstrated by their level of internal consistency, factor stability, and relationship to social desirability.

Some evidence was obtained for the validity of the hardiness component measures as shown by the pattern of interscale correlations in addition to correlations with measures of similar and dissimilar traits. Contrary to expectations no stress buffering effect was obtained for the hardiness composite measure or any of the individual components. Commitment was the only hardiness component

related to mental strain and physical illness - the effects for which were independent of stress. There was marginally significant evidence that commitment acted directly to reduce mental strain as well as indirectly by influencing social support. Commitment had a direct effect on physical illness as well as an indirect effect through its positive impact on transformational coping. These and other findings are discussed in greater detail below. The results are interpreted in relation to Existential Personality Theory and its application to stress resistance in women. The section that follows considers the significance of the present investigation and its implications for the conceptualization and measurement of hardiness. The final section contains a summary of the results and conclusions.

Psychometric Properties of Revised Hardiness Questionnaire

The results of the factor analysis at baseline assessment indicated that the revised hardiness questionnaire could be reduced to three empirically distinct dimensions corresponding to the following specific personality characteristics 1) control in social relationships; 2) challenge appraisal and behaviors; and 3) commitment to self, work, and social relationships. A fourth factor comprised mainly of negative exemplars of challenge, commitment and control

indicative of a general negative cognitive perceptual set also emerged.

The mean communality estimate in the revised hardiness questionnaire was lower (.40 at baseline, .45 at 3 months) than that observed in the pilot hardiness questionnaire (.60). One explanation why the factor structure accounted for less variance in the revised hardiness questionnaire may be because items were included that had minimal or no relationship to social desirability. One source of shared variance in the pilot questionnaire may have been social desirability. It will be recalled that the pilot hardiness factors were significantly correlated with Jackson's Social Desirability Scale.

An alternative approach to assessing the underlying factor structure of the questionnaire would have been to do a principal components analysis. The results of principal components analyses on this data may have been quite different than the classical factor analytic findings presented in this study because a greater proportion of the variance in the questionnaire items is being explained (100% vs. 40% at baseline, 100% vs. 45% at three months).

In accordance with the conceptualization of hardiness as an "interlocking" set of personality attributes, control, challenge, commitment and negative

cognitive perceptual set were intercorrelated. The internal consistency was acceptable for the control scale while that for the challenge and commitment scales were in the low-moderate range and poor for the negative cognitive set scale. Relative to the magnitude of their internal consistency at baseline and three month assessments the scale intercorrelations for control and challenge were substantially lower providing further evidence that they were empirically distinct factors. In contrast, the magnitude of the correlation between general negative cognitive set and commitment was almost as high as the internal consistency for these factors at the three month assessment.

With respect to the three month test-retest reliability of the factors, the control and challenge scales are acceptable whereas the reliability for the commitment scale is low-moderate. Challenge had an unstable factor structure. The challenge dimension split into two factors at the three month assessment - appraisal consisting of nearly all negative indicators (Factor II) and behavioral challenge (Factor III) consisting of all positive indicators. The test-retest correlation for the negative perceptual set factor was low. In addition, the underlying factor structure of the hardiness questionnaire particularly with respect to Factor IV was quite unstable. Factor IV, at the three

month assessment, reflected commitment to self/work. No factor suggestive of a general hardiness characteristic emerged at the three month assessment. General negative perceptual set demonstrated poor internal consistency and stability of factor structure in part a function of having only six items.

An additional psychometric issue concerns the extent to which the factors are empirically distinct from social desirability. Relative to the magnitude of the correlation with social desirability as assessed by the JSDS (Jackson Social Desirability Scale) and MCSDS (Marlowe Crown Social Desirability Scale) the internal consistency of the control and challenge dimensions were higher suggesting that these two factors were empirically distinct from social desirability. Both commitment and the general factor, however, demonstrate a relationship with the JSDS almost as high as their internal consistency at the three month followup assessment. Therefore it is difficult to assess what content independent of social desirability commitment and Factor IV are tapping. Another reason why the JSDS and hardiness factors might be so highly intercorrelated is because they may covary with illness. A number of items on the JSDS are confounded with health status including "I have a number of health problems.", "I almost always feel sleepy and lazy", "Many things

make me feel uneasy", "I am seldom ill", and "Rarely if ever has the sight of food made me ill". The MCSDS has no health related items and compared to the JSDS has consistently lower correlations with the hardiness components.

The results provide some evidence for convergent validation of the challenge, commitment, and control subscales. Challenge was significantly correlated with sensation-seeking. As this correlation was greater in magnitude than the association of challenge with external control or social support, it provides some evidence for discriminant validation. As expected the control in social relations factor was inversely related to external locus of control. However evidence for discriminant validity is lacking as the control scale was slightly more highly correlated with social support than it was with general external locus of control.

Evidence for the validity of the commitment scale is weak. As expected, commitment was significantly correlated with global satisfaction and perceived reciprocity in primary social network relationships. However commitment was even more highly correlated, in an inverse direction, with external locus of control. Negative perceptual set was also significantly related to external locus of control. This raises the possibility that one source of the shared variance

among the four factors may be their correlation with global external control. Community health nurses may possess a high need for control. Relative to nursing in other health care settings, community health nurses may be drawn to this area of specialty which permits them a greater level of freedom and autonomy and fewer organizational constraints on their performance. Generalized control may constitute a pervasive element in community health nurses' orientation towards challenge and commitment.

It is unclear from this study whether or not the community health setting attracts individuals who have a need for control or whether the setting engenders a high need for control. Do nurses with an external locus of control tend to avoid community health care settings? If nurses who are high in external control pursue community nursing, do they drop out or practice in community settings as long as nurses who have an internal locus of control. One way of addressing these issues would be to assess student nurses and follow them up to see what nursing areas they choose to practice and over what periods of time.

External locus was not found to account for all of the covariation between the hardiness factors. The partial correlations between the factors (i.e. correlations between factors controlling for correlation

with external locus of control) at the baseline assessment were statistically significant. At the followup assessment a similar pattern of partial correlations were obtained with one exception - the relationship between challenge and negative cognitive set failed to reach statistical significance after the effect for generalized external locus of control was partialled out (partial r = .09). Therefore it is unlikely that the shared variance between challenge and general negative perceptual set reflects a measure of stress resistance over and above anything accounted for by external control.

In testing the stress buffering effects of hardiness, it was assumed that hardiness scores were continuous measures and the results obtained were based on parametric statistical tests. An alternate approach to assessing hardiness would entail the classification of individuals in terms of categories or classes of stress resistance. Individuals could be classified as high in all three components, high in combinations of two of the components, high in only one of the components, or high on none, yielding a total of eight classifications which could be assessed with respect to their stress buffering properties.

Challenge, Commitment, and Control As Buffers of Stress on Health

Contrary to expectations, neither the hardiness composite nor any combination of challenge, commitment, control or any of the individual components ameliorated the negative effects of stress upon health. This is consistent with previous research conducted with female samples (Rhodewalt & Zone, 1989; Schmied & Lawler, 1987; Wiebe & McCallum, 1986). One explanation for the lack of a stress buffering effect is that perhaps challenge, commitment and control are not the personality characteristics which are likely to exert protective effects in women. The conceptualization of the hardy and nonhardy personality is derived from the existential notions of authentic and inauthentic states of being. Sartre (1956) characterizes the authentic state of being as "being-for-itself" whereby individuals are in a dynamic state, open to new experiences, tolerant of change, and in a process of learning new things about themselves. No end state is ever arrived at in life. In contrast the inauthentic state of being or "being-in-itself" is characterized by an individual's inability to see beyond one's current condition and the acceptance that one's plight is immutable. Life's purpose and meaning is derived from maintenance of the status quo.

Simone de Beauvoir (1952) was one of the first authors to incorporate this existential formulation into an analysis of gender role identification, conflict, and

transcendence. She proposed that cultural forces were more likely to shape and sustain the expression of "being in itself" in women than men. Women by virtue of their ascribed gender roles are higher in need for expressiveness, nurturance, and dependence. Moreover they are socialized to derive their sense of purpose and value in life by maintaining the status quo. Perhaps providing affection and nurturance to others and maintaining a passive and subservient role may be the characteristics relevant to stress resistance in women. These characteristics may affect the appraisal of life events. For example a woman offered a promotion at work may or may not conceive of this as an opportunity for personal growth. Appraisal of the event as an opportunity to meet her family's needs and serve her boss may be associated with stress resistance as opposed to appraisal of the event as an opportunity for the woman to assert herself and achieve personal growth. It is important to note that this position implies that women who appraise life change in a way that is perceived as controllable and enhancing personal growth may experience a threat to their femininity and experience greater mental strain and physical illness. However this was not supported by the results of this study or that of other hardiness research with female samples (Schmied & Lawler, 1986; Wiebe & McCallum, 1986)

- hardiness was not positively correlated with psychological symptoms or physical illness.

In view of contemporary American society's increasing tolerance of cross gender behaviors, fewer women are likely to adhere exclusively to traditionally feminine gender linked behaviors. Given the diversity of the situations the majority of women encounter in their multiple roles inside and outside the home which can lend themselves to both assertive, independent behaviors and expressive, nurturant, cooperative behaviors, women have to balance the particular situational expectations with their personal needs. This poses difficulties for women especially if they are given conflicting messages about the expression of challenge, commitment, and control which may compound conflicts they may already have as a result of prior experiences.

The unconditional expression of challenge, commitment, and control in men historically has been sanctioned at a broad cultural level whereas for women the expression of these attributes are fostered in a more limited context. Thus the stress buffering effects of hardiness in females may be more situation specific than in males. The capacity for challenge, commitment, and control to exert a stress resistant effect may also be a function of a woman's level of gender-role

transcendence. To the extent that women experience conflict about exerting control over their environment and achieving meaningful personal growth they may experience no or weak stress buffering effects for challenge, commitment, and control.

A source of environmental stress among a growing number of working women relates to how they can reconcile their family and work demands. Much media attention has been given to the increasing number of fathers who want more responsibility in child rearing duties in addition to maintaining a full time job. These men are breaking new ground in the sense that they have no male role models. Women may experience considerable conflict at the prospect of relinquishing control of an area that has been traditionally their domain. A high need for control in such a situation may have a deleterious effect on health.

Another explanation for the lack of stress buffering effects for the hardiness components relates to weaknesses in the measurement of the constructs. With respect to challenge, some convergent and discriminant evidence was obtained for its validity. Of interest was whether challenge acted in accordance with the existential formulation - that is were research participants with a high level of challenge more likely to appraise life events as less distressing than those

with a lower level of challenge? Research participants' ratings of the impact of ten of the most frequently endorsed life events were correlated with level of challenge. Nine of the ten most frequently endorsed life events at baseline were also the most frequently endorsed at the three month assessment (see Appendix E). There was no relationship at either the baseline or followup assessment between level of challenge and research participants' subjective appraisal of the stressfulness of any of these events. The dimension of challenge assessed both subjects' appraisal of novel, uncertain, and unpredictable situations and tendency to engage in novel behaviors. Perhaps this particular aspect of challenge may not be related to perceived stressfulness of the event and the illness inducing nature of the life events community health nurses encounter.

In the pilot phase of this research in which a list of occupation specific life events was formulated, community health nurses indicated increasing disillusionment and hopelessness with the current health care delivery system regarding being forced to do certain tasks including providing excessive written documentation and performing home health aid services that they perceived were not a part of their professional nurse role. A sense of rigidity in one's

professional role as opposed to a more flexible orientation may influence the way in which occupational life events are appraised and managed. Nurses reported a large number of job related events that weighed heavily in their life event score. It will be recalled that the life events score was calculated by summing the number of life events endorsed after being weighted by their chronicity. The flexibility or cognitive structure component of challenge may constitute the dimension which influences how nurses appraise the event and results in a stress buffering effect. The dimensions of the challenge construct which are relevant to the type of stress the particular occupational group under study is likely to encounter may not have been assessed in this study.

As seen with the challenge component, stress buffering effects for the control and commitment dimensions were not obtained. Methodological weaknesses in the revised hardiness questionnaire as discussed previously may account in part for this result. Another factor which may account for the lack of effect for control is the restriction of range in the distribution. The community health nurses tended to be high in their level of control in social relationships. With the range of scores being 1-14 at baseline and 3-15 at 3 months, 68% of the respondents had scores falling

between 9-15. Another factor which may account for the lack of a stress-buffering effect is the scope of the control scale. It assesses influence in social relationships as opposed to a general control factor. It should be noted that global locus of control items in earlier versions of the questionnaire (i.e. original 45 item and pilot hardiness questionnaire) either failed to load coherently on one factor or were confounded with challenge and commitment. Perhaps a more generalized locus of control measure would have exerted a stress buffering effect. This however was not confirmed when generalized external locus was tested for its stress buffering effect.

As the nature of the life events occurring were largely work related perhaps a scale assessing another aspect of control relevant to the nature of the stressors may have been more appropriate to use - e.g. work-related powerlessness. Relatively few life events were endorsed in the areas of love and marriage, children, and family where control in social relationships may serve as a buffer. There were a number of events endorsed with respect to social activities (i.e. increased organizational activities, took a vacation, took up a new recreational activity and made new friends) but the frequency of occurrence was less.

In addition to the lack of a stress buffering effect for life events, control in social relationships was not found to buffer the effects of network stress on strain or illness. Although control in social relationships is relevant to the nature of the illness inducing event it may not have buffered the effect of network stress due in part to the weak main effect obtained for network stress on strain and physical illness.

With respect to commitment the lack of a stress buffering effect may be due to its weak psychometric properties as discussed previously. Commitment was significantly correlated with generalized locus of control and social desirability and unrelated to primary social network size and importance of receiving social support. Commitment had a greater correlation with external control than it did with the social support indexes.

General negative perceptual set interacted significantly with life events such that the lower both the level of stressful life events and negative perceptual set at baseline the lower the level of mental strain at three month followup. The nature of this effect is consistent with the view that hardiness interacts with stress to lower level of strain - that is it provides a palliative function as opposed to what

Gore (1985) distinguishes as a buffering effect (i.e. high hardiness and high stress are associated with better health outcomes than high hardiness and low stress). This finding should be viewed guardedly in light of its weak effect - only two percent of the variance was explained. This result does not indicate that negative cognitive perceptual set is a stress mediator or stress moderator because the main effect for this factor failed to reach statistical significance.

Challenge, Commitment, and Control As Illness Resistant Resources

Contrary to expectations, the control component of the revised hardiness questionnaire failed to exert a reliable main effect on strain or illness. It may be the case that the control dimension was too narrow in scope as it assessed only social relationships and was restricted in its range in this study sample. To test whether a general locus of control measure might be related to health independent of stress, separate regression analyses were performed with illness and strain as the outcome variables and external locus of control as the independent variable. External locus of control was significantly related to baseline level of physical illness such that the greater the external locus the higher the level of physical illness. Only 4%

of the variance in illness was explained by locus of control. One explanation why generalized control was found to exert a weak effect on health may be related to characteristics of the phrasing of the item. Previous research on locus of control has shown that individuals interpret items differently based upon whether the items are worded in the first or third person (Kerner, personal communication, 1989). Purported race differences in locus of control were not supported when scores were controlled for first person versus third person phrasing. It could be argued that women who may be in situations where they have little control may respond in the external direction to third person worded items reflecting their actual plight. Of relevance to this study is what impact, if any, would such perceptions have on illness resistance.

To determine whether responses to first person and third person items were differentially related to illness, two subscale total scores were derived from first person worded items (see Appendix B.10 items #8, 12, 22, 24, 27, 28) and third person worded items. No major difference was obtained between the correlations for illness and scores on first person worded items ($r = .22$) and third person worded items ($r = .19$). It appears that a sense of personal versus impersonal control may not be differentially related to health.

However, it is important to point out that research participants in this study are middle class and largely caucasian. These findings may not be generalizeable to low socioeconomic groups or minorities who may experience a lack of control imposed by cultural norms. It may be the case that an external locus of personal control may have a different impact on illness resistance than an external locus of impersonal control depending upon socioeconomic status and ethnicity.

Commitment was found to make a significant unique contribution to the variance in physical illness assessed at baseline and strain assessed at baseline and three months. In addition, it was associated with a lower frequency of work absenteeism both at baseline and 3 month followup. The results indicating a significant effect for control and commitment on health outcomes could be contested on the grounds that both measures are significantly correlated with social desirability. When multiple regression analyses were rerun controlling for social desirability using the MCSDS, the effects for commitment and control held up. With respect to the variance in physical illness, both external control and commitment made significant unique contributions . The combined effect of external control and commitment on physical illness accounted for 5% of the variance after controlling for social desirability (MCSDS). These

results are consistent with those of other hardiness studies in which control and commitment were found to constitute illness resistant resources (Schmied & Lawler, 1986; Hull, Treuren, & Virnelli, 1987).

No illness resistant effects for the challenge component were obtained. This may be explained in part by its poor psychometric properties (unstable factor structure). As mentioned previously aspects of challenge relevant to illness resistance in women may not have been measured. Flexibility may be an important component for illness resistance in women especially if they function in multiple roles that necessitate the expression of both traditionally masculine and feminine gender linked behaviors.

It should be noted that the prospective-longitudinal design of this study allowed for the assessment of the impact of challenge, commitment, and control on change in strain and physical illness over the three month study period. However, baseline and follow-up measures of strain and illness were highly correlated ($r = .67$ and $r = .66$). This suggests that the study sample was quite stable with respect to health status. An alternative approach that might allow one to assess change in illness over a three month period would entail assessing nurses after having been exposed to drastic environmental changes. With respect to

community health nurses, examples of such events might include home health aid layoffs and bus strikes. This type of major stressor might result in greatly increased strain and illness - the magnitude of which could be assessed in a prospective-longitudinal design.

Psychosocial Mechanisms Underlying the Commitment-Health Relationship

There was a trend for commitment to exert both direct and indirect effects on strain at 3 months through social support. This trend in the findings is consistent with the description of the hardy personality. One explanation for the weak effect for commitment is due to the previously mentioned methodologic shortcomings in the measurement of the commitment scale. Contrary to expectations, commitment did not exert an effect on physical illness through social support. The mechanism underlying the commitment-physical illness relationship was transformational coping. It should be noted that commitment, social support, and coping were significantly intercorrelated. The existence of statistical correlation among independent variables or multicolinearity can reduce the statistical power of obtaining a significant effect. These results must be interpreted with caution as the effects were found only for concurrent level of illness.

Previous research has shown that hardiness affects health in women vis a vis its effect on health practices (Wiebe & McCallum, 1986). The results of this study indicate that the commitment component of hardiness is unrelated to health practices. However external locus of control was positively related to negative health practices therefore the control component of hardiness may exert its stress resistant effect through health practices.

Implications For The Conceptualization and Measurement of Hardiness

This research demonstrates support for a general hardiness factor (negative cognitive perceptual set) whose interaction with life events is associated with lower mental strain. This general factor contains primarily negative indicators of challenge, control, and commitment and is similar to the general factor obtained by Kobasa et al., (1982) in a male sample. Existential personality theory can provide a basis for refining the conceptualization of this general factor in relation to stress resistance. A negative cognitive perceptual orientation towards self, work, and change is consistent with the existential formulation of the inauthentic personality style - a style characterized by feelings of worthlessness, insecurity, and uncertainty towards the future. Consistent with the notion of the authentic

personality would be a sense of courage, tendency for perseverance, and the use of imagination, symbolization, and judgment. With respect to women, this general stress resistant resource may not be bipolar because women may possess elements of both the inauthentic and authentic states of being arising in part from unresolved gender role conflict.

The general factor obtained in this study is similar in some respects to another general personality variable hypothesized to affect health outcomes - optimism or a positive generalized expectancy (Scheier & Carver, 1985). To facilitate a more precise conceptual understanding it would be useful to examine factor analyses done with hardiness measures on the item level and scale level across different occupational groups to arrive at a better understanding at what may constitute this core component of stress resistance.

It would also be important for the viability of the hardiness model to demonstrate empirically how the general factor differs from neuroticism (Allred & Smith, 1989) and negative affectivity. Previous research has shown that when neuroticism (Funk & Houston, 1987) was controlled the relationship between hardiness and health did not hold up.

The general hardiness factor may be a common factor in stress resistance but may not be equally influential

in buffering the effects of all types of stress on illness. The extent to which specific personality attributes such as control, challenge, and commitment exert an independent and interactive stress resistant impact may be a function of the type of stress experienced by the particular group under study. The sample of community health nurses in this study experienced substantial environmental stress unique to their occupation. It is important for investigators to conceptualize what aspects of challenge (e.g. flexibility), commitment (e.g. work) and control (e.g. powerlessness) would be relevant to stress resistance in the occupational group targetted for study.

Minimizing the extent to which hardiness questionnaire measures tap acquiescence and social desirability is another major concern with respect to the assessment of hardiness. The measurement of challenge was problematic in that at the three month assessment negative indicators loaded on one factor and positive indicators loaded on another factor thus acquiescent responding may have been elicited. This research demonstrates, especially with regard to the measurement of commitment, that its positive relationship to social desirability is not easily minimized. Social desirability in addition to being conceived of as a source of response style bias can also

reflect certain personality and behavioral tendencies consistent with an inauthentic state of being. Individuals high in social desirability, as assessed by the MCSDS, have been found to give fewer, more concrete responses on tests of fantasy and to rate a monotonous task as dull more often than subjects low in social desirability (Kobasa & Maddi, 1977). It is recommended that the relationship of hardiness and social desirability be assessed at all stages of test construction because the nature of the relationship between hardiness and social desirability provides important evidence concerning the validity of the measure.

Summary and Conclusions

The purpose of this investigation was to examine whether all three personality components of hardiness - challenge, commitment, and control were needed to exert a stress buffering effect on health and to identify the psychosocial mechanisms underlying the illness resistant effects. In order to test the independent and interactive stress resistant effects for the hardiness components it was necessary to employ a hardiness measure in which the components constituted empirically distinct dimensions. Factor analyses performed on a revised version of the hardiness questionnaire provided

support for the existence of four empirically distinct dimensions corresponding to control, challenge, and commitment and a general personality factor consistent with a negative cognitive-perceptual orientation.

Two sources of stress were found to be significantly related to mental strain and physical illness in this predominantly female sample - major life events and network stress. No stress buffering effects for the hardiness composite or any of the components were obtained. Three possible explanations were presented to account for these findings: 1) stress resistance effects for hardiness may be situation specific in women to the extent that cultural forces and occupational norms do not unconditionally support women's development and expression of hardiness, 2) the stress buffering effects for challenge, commitment, and control may in part be a function of a woman's level of gender role conflict, and 3) psychometric weaknesses in the measurement of the constructs. These effects could not be separated out in this study.

Negative cognitive perceptual set interacted with life events to affect future strain. Subjects who were low on both life events and negative cognitive perceptual set exhibited lower mental strain. Although this finding must be viewed guardedly due to its weak effect and unreliability in the measurement of this

hardiness component, it raises the possibility that a general or higher order hardiness factor in addition to the specific hardiness components may affect health. The existence of a general cognitive perceptual factor in stress resistance is consistent with the conceptualization of the hardiness construct which emphasizes the role of cognitive-perceptual processes in shaping the stress response (Kobasa et al., 1982).

Commitment accounted for a small but statistically significant unique portion of the variance in mental strain and physical illness after controlling for social desirability. Two mechanisms consistent with the hardiness model were implicated in the commitment-health relationship. Marginal support was obtained for the proposition that commitment reduces mental strain directly and indirectly by influencing social support. Commitment exerted a negative impact on physical illness directly and indirectly via transformational coping. Commitment was also associated with a lower frequency of work absenteeism at baseline and three month followup providing further evidence that it constitutes an illness resistant resource.

In contrast to commitment, both control in social relationships and challenge were unrelated to health, probably for different reasons. Relative to the other hardiness component measures, control in social

relationships demonstrated strong psychometric properties. It may have failed to exert an illness resistant effect because the content domain that was assessed was too narrow in scope. It will be recalled that generalized external locus of control was inversely related to mental strain. The challenge component may have not exerted a significant effect on health because it failed to tap aspects of challenge relevant to health in women and/or had unreliable psychometric properties.

The results of this study illustrate the difficulties encountered in investigating the role of hardiness in stress resistance in women. Since each of the components may differentially affect health outcomes, the stress resistant properties of the hardiness components should be assessed separately. In this way, a core or generic component may be identified as well as specific stress resiliency factors. Investigators using this approach must pay close attention to interactions between the person and situation. Such interactions may not indicate that the involvement of personality factors in stress resistance constitute unique or highly occupation specific processes. Rather, they may reflect systematic and predictable patterns of associations between individual difference factors (e.g. commitment, coping) and

environmental demands (e.g. masculine versus feminine gender linked) that may underlie stress resistance. Existential Personality Theory and Gender Role Models can provide a useful framework for delineating the nomological network in which the construct validity of these measures can be assessed.

Appendices

APPENDIX A

Loading of Items on Each of the Four Factors From the 45-Item Hardiness Questionnaire

APPENDIX B

Instruments

APPENDIX C

Community Health Nurse Sample Recruitment Letter

Dear Community Health Nurse,

As an advanced graduate student in the doctoral program in Social-Personality Psychology at the City University of New York, I am conducting a study of psychological factors involved in the maintenance of health. The search for answers to questions regarding what keeps people healthy has emerged as an area of increasing concern to psychologists and social scientists, as well as health care professionals. Studies of this topic have been conducted with various occupational groups including business executives, clergymen, attorneys, physicians and inpatient hospital nurses. Community health nurses have received little of this research attention. As a former community health nurse, I have a special interest in focusing on this group.

Your participation in this study would be greatly appreciated. To be able to draw conclusions from our results we need as large a sample size as possible. In addition to this information being of potential interest to you, it may be of help to others. It will increase knowledge of the type of health maintenance programs needed by community nursing service providers.

Participation in this study requires that you complete two parts of a questionnaire that is mailed to you. The second part is to be completed 3 months after the first part. Each part requires approximately 45 minutes to complete. All responses will be kept strictly confidential. If you wish to participate in this study, please return the enclosed post card. Note by providing your name and address you will enable receipt of the questionnaire, but no connection can be made between the name on the post card and your anonymous responses. In that way the confidentiality of your responses will not in any way be jeopardized. Finally, if you wish to know about the results of the study, we will be pleased to provide them if you check the box on the post card.

Sincerely,

Helen Dermatis, R.N., M.A.

APPENDIX D

Descriptive Statistics on Selected Study Variables

Descriptive Statistics On Selected Variables

	Baseline (N = 359-385)				3 Months (N = 242-278)			
	$\bar{X}$	SD	RANGE	SKEWNESS	$\bar{X}$	SD	RANGE	SKEWNESS
Life Events[a]	45.1	15.0	10-106	1.16	38.1	12.2	11-93	1.11
Network Stress[b]	.41	.36	0-1.67	1.07	.41	.34	0-1.6	.94
Control (Con)	12.77	2.87	2-16	-1.29	13.11	2.84	4-16	-1.25
Challenge (Chal)	5.58	2.16	0-10	.04	5.74	2.04	1-10	-.11
Commitment (Com)	8.13	1.55	0-10	-1.3	8.12	1.41	3-10	-.95
Negative Perceptual Set	1.13	1.01	0-5	.68	1.16	1.12	0-5	1.14
Con + Chal[c]	21.17	4.79	3.5-31	-.52	21.70	4.56	6.5-31	-.65
Con + Com	24.98	4.31	3-31	-1.39	25.31	3.99	9.5-31	-1.1

[a] Life Events Score calculated by summing the number of events endorsed after having been weighted for frequency of occurrence.

[b] Network Stress score calculated by first summing the number of major life events occurring to members of the respondents primary social network perceived by the respondent as having a negative impact on her or him and then dividing by the numbers of persons in the primary social network.

[c] Since control had 1.5 times as many items as that contained in challenge and in commitment the combination score for control and challenge was calculated by adding the total for control to the total for challenge multiplied by 1.5; the con/com combination score was calculated in the same manner.

Descriptive Statistics on Selected Variables

	Baseline (N = 359-385)				3 Months (N = 242-276)			
	$\bar{X}$	SD	RANGE	SKEWNESS	$\bar{X}$	SD	RANGE	SKEWNESS
Chal + Com	13.71	2.98	3-20	-.44	13.89	2.74	5-19	-.46
Con + Chal + Com[a]	33.38	5.97	8.5-46	-.77	33.96	5.56	15.5-46.5	-.69
Strain	2.64	1.93	0 - 12	1.05	2.17	2.00	0-10	1.28
Number of Physical Symptoms Reported	10.09	6.10	1 - 38	1.30	6.00	5.50	1-36	1.45
Weighted Physical Illness Score	1158.06	1010.8	43-10,097	3.54	915.84	820.91	21-6063	2.44
Log Transformation Weighted Illness Score	2.93	.38	1.6-4.0	-.70	2.79	.42	1.3-3.8	-.69
Number of Life Events Endorsed	15.24	10.35	1-57	1.58	10.10	7.5	1-47	1.87

[a] Since Control had 1.5 times as many items as that contained in challenge and in commitment the hardiness composite score was calculated by adding the total for control to the total for challenge multiplied by 1.5 and the total for commitment multiplied by 1.5.

APPENDIX E

Frequency of Endorsement of Life Events

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
SCHOOL		
1. Started school or a training program after not going to school.	25	14
2. Changed schools or training program.	10	5
3. Graduated school or training program.	17	12
4. Had problems in school or in training program.	15	6
5. Failed school, training program.	2	0
6. Did not graduate from school or training program	2	1
WORK		
7. Started work for the first time.	12	7
8. Returned to work after not working for a long time.	10	5
9. Changed jobs for a better one.	26	13
10. Changed jobs for a worse one.	3	3
11. Changed jobs for one that was no better and no worse.	8	3
12. Had trouble with a boss.	34	25

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
13. Demoted at work.	1	2
14. Found out that was not going to be promoted at work.	10	6
15. Conditions at work got worse, other than demotion or trouble with the boss.	39	32
16. Promoted.	22	11
17. Had significant success at work.	69	55
18. Conditions at work improved, not counting promotion or other personal successes.	47	33
19. Laid off.	2	2
20. Fired.	1	2
21. Started a business or profession.	6	3
22. Expanded business or profession.	12	7
23. Took on a greatly increased work load.	51	35
24. Suffered a business loss or failure.	4	2
25. Sharply reduced work load.	10	8

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents	
	Baseline (N = 385)	3 Months (N = 260)
26. Retired.	1	2
27. Stopped working, not retirement, for an extended period.	10	8
LOVE AND MARRIAGE		
28. Became engaged.	9	4
29. Engagement was broken.	3	1
30. Started a love affair.	14	6
31. Relations with spouse for the worse, without separation or divorce	15	12
32. Married couple separated.	4	1
33. Divorce	3	1

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents	
	Baseline (N = 385)	3 Months (N = 260)
34. Relations with spouse changed for the better.	32	26
35. Married couple got together again after separation.	1	1
36. Marital infidelity.	4	1
37. Trouble with in-laws.	10	6
38. Spouse died.	1	1
HAVING CHILDREN		
39. Became pregnant·*	7	2
40. Birth of a first child.	4	1
41. Birth of a second or later child.	2	1
42. Abortion.*	2	1
43. Miscarriage or still birth.*	2	1
44. Found out that can not have children.	2	1
45. Child died.	1	0

* Not included in life events score because confounded with illness

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
FAMILY		
46. Adopted a child.	1	0
47. Started menopause.*	7	5
48. New person moved into the household.	11	7
49. Person moved out of the household.	17	7
50. Someone stayed on in the household after he was expected to leave.	9	4
51. Serious family argument other than with spouse	23	13
52. A change in the frequency of family get-togethers.	33	19

* Not included in life events score because confounded with illness

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents	
	Baseline (N = 385)	3 Months (N = 260)
53. Family member other than spouse or child dies.	17	8
54. Moved to a better residence or neighborhood.	14	7
55. Moved to a worse residence or neighborhood.	2	1
56. Moved to residence or neighborhood no		
57. Unable to move after expecting to be able to move.	7	5
58. Built a home or had one built.	4	1
59. Remodeled a home.	20	17
60. Lost a home through fire, flood or other disaster.	1	0

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
CRIME AND LEGAL MATTERS		
61. Assaulted.	1	1
62. Robbed.	5	2
63. Accident in which there were no injuries.	20	12
64. Involved in a law suit.	7	4
65. Accused of something for which a person could be sent to jail.	1	3
66. Lost drivers license.	1	0
67. Arrested.	0	0
68. Went to jail.	0	0
69. Got involved in a court case.	6	3
70. Convicted of a crime.	0	0

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
71. Acquitted of a crime.	1	0
72. Released from jail.	0	0
73. Didn't get out of jail when expected.	0	0
FINANCES		
74. Took out a mortgage.	15	7
75. Started buying a car, furniture or other large purchase on the installment plan.	28	14
76. Foreclosure of a mortgage or loan.	1	0
77. Repossession of a car, furniture, or other items bought on the installment plan.	1	0
78. Took a cut in wage or salary without a demotion.	8	6

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
79. Suffered a financial loss or loss of property not related to work.	16	8
80. Got a substantial increase in wage or salary without a promotion.	26	22
81. Did not get an expected wage or salary increase.	10	5
82. Had financial improvement not related to work.	18	13
SOCIAL ACTIVITIES		
83. Increased church or synagogue, club, neighborhood or other organizational activities.	42	30
84. Took a vacation.	68	45
85. Was not able to take a planned vacation.	18	12
86. Took up a new hobby, sport, craft or recreational activity.	32	19
87. Dropped a hobby, sport, craft or recreational activity.	18	10

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
88. Acquired a pet.	17	8
89. Pet died.	12	7
90. Made new friends.	58	36
91. Broke up with a friend.	13	11
92. Close friend died.	11	3
MISCELLANEOUS		
93. Entered the Armed Services.	1	0
94. Left the Armed Services.	1	1
95. Took a trip other than a vacation.	33	20
96. Marriage.	7	2
JOB SPECIFIC		
97. Excessive paper work.	71	58
98. Excessive workload upon returning to work after taking days off.	60	45

Frequency of Endorsement of Life Events Occurring at Baseline and Three Month Followup

	Percentage of Respondents Baseline (N = 385)	3 Months (N = 260)
99. Lack of reliable ancillary patient services (e.g. housekeeping, counseling, nurse's aid).	52	37
100. Lack of supervisory input in management of patient caseload.	43	35
101. Lack of communication with co-workers.	49	38

APPENDIX F

Items with Substantial Loadings on Hardiness Factors Obtained at Baseline

Items with Substantial Loadings on Hardiness Factors Obtained at Baseline

Factor I Items (Control)	Loadings
I doubt whether I can get my family to follow my way of doing things.	.59
I don't think my friends would follow the advice I give them.	.50
My friends hardly ever follow my example.	.43
I almost never get my family to come around to my way of thinking.	.47
My family members take advice I give them seriously.	-.47
If my family members had to make a major decision, they would discuss the matter with me first.	-.46
Factor II Items (Challenge Appraisal)	
I don't like things to be uncertain or unpredictable.	.50
I usually don't look forward to having to do something at work that I've never done before.	.45
Unfamiliar situations make me feel uncomfortable.	.41
I can't imagine making any drastic changes in my life right now.	.37
Factor III Items (Commitment)	
I feel a sense of accomplishment with the way I spend my days.	.54
I have little interest in my work.	-.48
Most of my work is just too boring to be worthwhile.	-.35
I usually enjoy meeting new people.	.39
I value my work.	.54

APPENDIX G

Factor Loadings of Health Practice Items

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