CONTROL, COMMITMENT, AND CHALLENGE: RELATIONSHIPS TO STRESS, ILLNESS, AND GENDER

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Judy Embry, B.A., M.S.
Denton, Texas
May, 1992
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Male and female college students were administered scales assessing their daily hassles, negative life events, control, commitment, challenge, psychological symptomatology, psychological distress, and physical symptomatology. Stepwise multiple regression analyses showed that control, commitment, and challenge act in an additive (rather than multiplicative) manner in relation to psychological and physical outcome measures. For males, there was evidence that the composite of control, commitment, and challenge (hardiness) acts as a moderator of life hassles in relation to psychological outcomes. Although hardiness was related to physical outcome in males, there was no moderation effect for this outcome. In females, no moderation effects were shown, although hardiness was related to psychological distress and physical symptoms. Also, in females, high control was related to psychological symptoms, while high commitment was related to psychological distress and physical symptoms. Results were discussed in terms of possible measurement bias and/or inadequacy of the hardiness construct for women.
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CONTROL, COMMITMENT, AND CHALLENGE: RELATIONSHIPS TO STRESS, ILLNESS, AND GENDER

A large body of evidence has accumulated over the past twenty-five years that demonstrates a link between stressful life events and both psychological and physical health (Dohrenwend & Dohrenwend, 1974, 1981; Rabkin & Struening, 1976). The more recent emphasis in studies of the relationship between stress and illness has been on identifying social and personality variables that may act as moderators or buffers against the effects of stress (Caldwell, Pearson, & Chin, 1987; Johnson & Sarason, 1979). The personality construct of hardiness, a constellation of commitment, control, and challenge, has received extensive attention as a moderator variable. However, research supporting this conceptualization of hardiness has been criticized, and several studies have failed to find the expected stress-moderating effect (Carver, 1989; Funk & Houston, 1987; Hull, Van Treuren, & Virnelli, 1987). The current investigation was conducted to further examine and clarify the relationships of commitment, control, and challenge to stress and illness.

Stress and Illness

The foundation for research on the relationship between stressful life events and illness was laid by
Cannon in the 1920s when he demonstrated changes in human physiological processes in response to stimuli associated with emotional arousal. In addition to laboratory observations, Cannon also cited numerous striking clinical cases suggesting the pathogenic potential of emotional arousal and bodily changes (Cannon, 1929). In the 1930s Meyer also made a major contribution to the study of stress and illness when he began to use life charts as tools in medical diagnosis, teaching that life events are an important part of the etiology of a disorder and that even normal and necessary live events can be important contributors to the development of illness (Meyer, 1951). Meyer’s teachings were reflected in a 1949 conference of the Association for Research in Nervous and Mental Disease, reported by Wolff (1950), where for the first time, the focus was on the effects of life stress on various body systems. At Cornell University, studies of thousands of patients in the late 1940s and early 1950s showed that certain life events cluster near the time of onset of symptomatology (Wolf & Goodell, 1968). By this time a wide range of disorders had been observed in relation to stressful life events (see Dohrenwend & Dohrenwend, 1974).

Selye (1956) provided a physiological model for the stress-illness connection, describing the process by which the body attempts to adapt to stressful influences. The model described reactions in the nervous and endocrine
systems that occur with prolonged exposure to any stressor. In research leading to the adaptation model, Selye demonstrated that stressful events result in physiological readjustments that change the likelihood of physical illness in an individual. He also pointed out that stress is a natural and necessary part of life. Hinkle, who had been a co-organizer of the Cornell research, supported the latter notion, observing that the effects of ordinary activities were not qualitatively different from the effects of acute stressors used in the laboratory (Hinkle, 1973). However, Hinkle also noted that the subjective experience or perception of the individual is as important as the objective features of the stressor in predicting illness symptomatology (Hinkle, 1974).

By the mid-1970s, the evidence for a relationship between stressful life events and illness had been supported repeatedly; however, the observed and reported magnitude of that relationship clearly was small. In fact, Rabkin and Struening (1976), in their review of the literature, estimated that stressful life events account for only about nine percent of the variance in illness. A related observation was that some individuals with little apparent stress become ill, while some with extremely high levels of stress remain well (Druss & Douglas, 1988; Hinkle, 1974). As Dohrenwend and Dohrenwend (1981) later pointed out, life stressors alone are neither necessary nor
sufficient to produce disease. As researchers began to examine the stress-illness connection more closely and to try to predict and control the pathological effects of stress, three major paths of study emerged: the stressful life events themselves; social conditions related to the life-stress process; and personality and styles of coping.

Life Stressors

Research on life stressors was at first stimulus-oriented. The focus was on discrete, time-limited events in the environment that impinge on an individual and that are stress-inducing. This focus began to change, however, as the research progressed.

Life Events

Holmes and his colleagues made major contributions in their studies of stressful life events and the degree of adaptive behavior or change required from individuals. These researchers systematized life events in a series of rating scales including the Schedule of Recent Experiences (Rahe, Meyer, Smith, Kjaer, & Holmes, 1964) and the Social Readjustment Rating Scale (Holmes & Rahe, 1967). They reported significant relationships between amount of change required by various acute life events and a wide range of disorders and disabilities (Holmes & Masuda, 1974).

The response to the life events approach was enthusiastic. As Holmes (1979) reported, in the 1970s,
over a thousand publications appeared based on the Social Readjustment Rating Scale alone. The life events method was used with a wide variety of populations; and significant relationships were reported between stress, as assessed by this method, and a host of physical and psychological outcomes (see Dohrenwend & Dohrenwend, 1974, for review of this literature).

However, several conceptual and methodological criticisms of the life events approach begin to arise. These issues, which have been reviewed by Perkins (1982) and Dohrenwend and Dohrenwend (1981), generally involved questions of generalizability of stress assessments using life events, theoretical constructs used in conceptualizing stress, and content validity of the scales. In regard to theoretical constructs, early life events research considered events to be nonspecific stimuli which elicit nonspecific responses (stimulus-response model). However, some researchers began to consider the interaction between characteristics of the individual and the situation (stimulus-organism-response model).

For example, the degree of undesirability of life events was found to account for more variance in illness than just the amount of change required of an individual (Chiriboga, 1977; Crandall & Lehman, 1977; Tenant & Andrews, 1978; Vinokur & Selzer, 1975; Zeiss, 1980). This finding led to the development of other instruments that
would take into account the impact of an event on the individual. One such instrument was the Life Events Scale (Sarason, Johnson, & Siegel, 1978), which allowed ratings of desirability or undesirability; this measure was found to be more highly correlated with outcomes than the Schedule of Recent Events. Based on these findings and others, investigators began to suggest the use of multifactorial models that would consider both individual differences and the social context of life stressors (Dohrenwend & Dohrenwend, 1981; Perkins, 1982).

Hassles

In contrast to the acute life events approach to the study of stress-illness, other researchers began to consider the significance of relatively minor day-to-day stressors that characterize life and that have an impact on health (Lazarus, 1980; Lazarus & Cohen, 1977; Lazarus, Cohen, Folkman, Kanner, & Schaefer, 1980). These more chronic daily demands became known as "hassles" (Kanner, Coyne, Schaefer, & Lazarus, 1981). The researchers reported that hassles operate independently of life events in predicting psychological symptoms and that hassles are more strongly associated with these outcomes than are acute life events (Kanner et al., 1981).

Kanner and colleagues also examined "uplifts," or positive day-to-day experiences, in relation to psychological outcomes (Kanner et al., 1981).
Interestingly, for men, they found no relationship between hassles and psychological symptoms. For women, however, uplifts measure was positively related to psychological outcomes; in addition, that relationship could be accounted for by common variance with the hassles score. These results were explained in terms of gender-related values, coping, and/or situational contexts.

Social Factors and Stress

The second major research path in the study of the relationship between stress and illness focused on the social factors that might increase or decrease the risk of pathology. These factors, along with personality and styles of coping, came to be called "moderator variables," that is, variables that mediate the impact of stressful life events and that can account for individual differences in response to stress (Johnson & Sarason, 1979).

Social Support

One area that received considerable attention is the impact of social support as a factor in moderating the effects of stress. A number of researchers offered evidence that social support has a stress-reducing effect on individuals (Caplan, 1974; Cobb, 1976; de Araujo, VanArsdel, Holmes, & Dudley, 1973; Eaton, 1978; Henderson, 1977; Nuckolls, Cassel, & Kaplan, 1972). In general, conclusions were that those with high stress and high social support are less likely to develop illness than
those with high stress and low social support (Cobb, 1976). There were notable exceptions to this general finding, however. Other studies showed social support to be related to psychological distress outcome measures but not to stress level (Andrews, Tennant, Hewson, & Valliant, 1978), to have a detrimental effect on health (Kobasa, 1982), and to have no effect on health (Lieberman & Mullan, 1978; Pearlin & Schooler, 1978).

Interpretations of this research have been complicated by differences in how social support was measured. Definitions of social support that have been offered in the literature have focused on a diversity of aspects, including: available information or material aid, availability of a confidant, gratification of emotional and social needs, sources of support, structure of support network, etc. (Wallston, Alagna, DeVellis, & DeVellis, 1983; Thoits, 1982).

Gender Roles

Related research has examined gender differences and social networks. A widely documented gender difference is that women report higher rates of psychological distress than men (Al-Issa, 1982). One major study by Kessler and McLeod (1984) suggested that higher rates of "network" life events (events occurring to people important to the respondent) account for much of the total sex difference in reported psychological distress. The authors pointed
out that females are more likely to involve themselves in network activities.

On the basis of their own research and that of others, Wethington, McLeod, and Kessler (1987) concluded that much of the gender difference in psychological distress is due to sex role socialization and sexual division of labor rather than to any pervasive disadvantage of women in capacity to withstand stress. Other writers also have concluded that socialization of women affects ability to deal with stress. Radloff and Rae (1979) concluded that girls are less positively reinforced than boys for controlling their environments. Other research has suggested that in both the workplace (Aneshensel & Perline, 1987; LaCroix & Haynes, 1987) and at home (Barnett & Baruch, 1987), women's roles are more likely than men's to be associated with low control over outcomes; these writers also have cited numerous studies suggesting that low control is related to increased incidence of illness.

Personality and Stress

Another major path of research has focused on personality factors as moderator variables in the stress-illness relationship. Although many variables have been considered, Type-A personality, locus of control, and hardiness have received considerable attention and support as moderators of stress.
Type-A

One well-known moderator variable is the Type-A personality. Friedman and Rosenman (1974) identified a behavior pattern they called Type-A that is associated with a tendency to develop heart disease. This pattern is characterized by competitiveness, high achievement orientation, time urgency, and tendency to become hostile when frustrated (see Carver & Humphries, 1982 for a review of Type-A). Glass (1977) extended this research in experiments that suggested that Type-As first try to exert themselves strongly to gain control when faced with stress; if this fails, they react with helplessness.

Locus of Control

Glass' finding suggested a link to Rotter's (1966) theory that individuals have a generalized expectancy, which he called locus of control, regarding their control of the events in their lives. Later studies suggested that those who expect their life events are controlled by others or by fate (external locus of control) are more susceptible to pathology.

Johnson and Sarason (1978) collected concurrent data from college students, using the Life Experiences Survey, Rotter's Locus of Control scale, and measures of anxiety and depression. They reported that only negative life events experienced by externally controlled individuals were significantly and positively related to both anxiety
and depression. Wheaton (1982) used a shortened version of the Rotter scale and measures of acute and chronic stressors to predict depressive symptoms. Regression analyses indicated that internal locus of control moderated acute, but not chronic stress. A later study using the same data set showed that internal locus of control buffered both types of stress in the prediction of schizophrenia (Wheaton, 1983). Lefcourt, Miller, Ware, and Sherk (1981) showed that internal locus of control moderated the effects of negative life events on mood disturbance in college students. Although there have been a few exceptions, the majority of studies that have used the Rotter scale have supported a stress-moderating role for internal locus of control as related to psychological outcomes (see Cohen & Edwards, 1989, for a review of this research).

**Hardiness**

In the late 1970s, another moderator variable hypothesized to moderate stress emerged in the form of a personality construct called hardiness. In introducing hardiness, Kobasa (1979) proposed that individuals who withstand high stress without becoming ill have personalities that differentiate them from those who do become ill under stress. She reported that the conceptual source of this proposition was taken from the fulfillment personality theories as described by Maddi (1976). In
addition to existential psychology's concept of authenticity (Kobasa & Maddi, 1977), Kobasa also cited White's concept of competence, Allport's concept of appropriate striving, and Fromm's concept of productive orientation as influences on her formulation.

In a later publication (Kobasa, Maddi, & Courington, 1981), hardiness was described as related to authenticity and to Antonovsky's (1979) sense of coherence. Still later, Kobasa, Maddi, and Puccetti (1982) reported that the hardiness construct was the result of an integration of existentialism with empirical leads from social, developmental, and personality psychology.

Kobasa et al. (1981) described hardiness as being composed of three components that are intertwined aspects of the construct: (a) the belief in one's ability to influence the course of events ("control"), curiosity about and sense of the meaningfulness of life ("commitment"), and the expectation that it is normal for life to change and for development to occur ("challenge"). Therefore, the hardy person would be expected to emphasize his or her own responsibility in life, to be involved fully in many situations of life, and to seek out change and new experiences as opportunities (Kobasa, 1987).

Kobasa et al. (1981) suggested that hardy persons make optimistic cognitive appraisals and take decisive actions that transform stressful events into less stressful forms.
The assumption was that this type of coping (transformational coping) leads to resolution and prevents the physiological debilitation associated with continuous demands for readjustment to stressors (Kobasa & Puccetti, 1983). Later writings (Kobasa, Maddi, Puccetti, & Zola, 1985) suggested that transformational coping, in contrast to regressive coping, includes the interpretation of events, activation of ideas on ways to confront a situation, decisions about the usefulness of these ideas, and mobilization of resources (internal and external). Hardiness was hypothesized to moderate or buffer the negative effects of stress on health through the activation of this coping process (Kobasa et al., 1985).

**Hardiness and Physical Health**

Kobasa’s (1979) original study used male executives as subjects. Health was assessed by the Seriousness of Illness Survey (Wyler, Masuda, & Holmes, 1968), stress was measured by the Social Readjustment Rating Scale (Holmes & Rahe, 1967), and hardiness was assessed by a questionnaire made up of several standardized instruments that Kobasa selected to tap the hardiness subcomponents: commitment, control, and challenge. She used discriminant analysis to identify the particular scales that discriminated between executives who were low illness/high stress and high illness/high stress. Subsequent studies used modifications of the resulting hardiness instrument, as will be discussed
later in this chapter. The original hardiness measure that came to be used in early research (Kobasa et al., 1981; Kobasa, Maddi, & Kahn, 1982; Kobasa, Maddi, & Puccetti, 1982) was composed of the following scales: for commitment, the Alienation from Self and Alienation from Work Scales of the Alienation Test (Maddi, Kobasa, & Hoover, 1979); for control, the Locus of Control Scale (Rotter, 1966) and the Powerlessness Scale of the Alienation Test (Maddi et al., 1979); and for challenge, the Security scale of the California Life Goals Evaluation Schedule (Hahn, 1966).

A series of studies of male executives followed the development of the hardiness construct and instrument. Using analysis of variance (ANOVA) techniques, main effects of hardiness on reports of illness were found to be significant and independent of social support (Kobasa & Puccetti, 1983), exercise (Kobasa et al., 1982b), Type-A personality (Kobasa, Maddi, & Zola, 1983), and constitutional predisposition (Kobasa et al., 1981).

These early studies were concurrent designs, however; that is, all data were collected at Time 1. Thus, the researchers could not rule out the possibility that stress and illness resulted in subjects becoming less hardy. In order to support a cause-effect relationship between hardiness and illness, Kobasa and colleagues developed prospective (or predictive) designs in which stress and
hardiness were measured at Time 1, and illness was measured at time intervals extending over three years. The prospective studies allowed for statistical control of initial illness, and thus helped rule out the possibility that illness led to stress (Cohen & Wills, 1985). For male executives, life events, constitutional predisposition, and hardiness showed significant main effects on illness (Kobasa et al., 1981). Another prospective study showed main effects on illness for both stressful life events and hardiness as well as an interaction effect for these independent variables (Kobasa et al., 1982b). In a third prospective study, Kobasa et al. (1985) reported that hardiness, exercise, and social support reduce the probability of illness.

A significant negative relationship between hardiness and reported health, regardless of degree of stress, has been supported by other researchers in concurrent design studies using teachers (Holt, Fine, & Tollefson, 1987), resident assistants (Nowack & Hanson, 1983), high school students (Wendt, 1982), college students (Banks & Gannon, 1988), blue- and white-collar workers (Manning, Williams, & Wolfe, 1988), and female college students (Rhodewalt & Zone, 1989). Prospective (predictive) studies also have shown a significant negative relationship between hardiness and health in police-officer cadets (Herlich, 1985) and students (Wiebe & McCallum, 19867; Banks & Gannon, 1988).
One of the criticisms of the hardiness research discussed above is that the researchers relied on self-report of illness. However, Kobasa et al. (1981) has reported 89% agreement between self-reported health and independent medical diagnosis. Some studies have tried to overcome the problem of self-report health measures by instead using objective health outcomes in studies of hardiness. For example, Pollock (1986) found a significant negative relationship between hardiness and health status as rated by physicians for diabetes patients; there was no effect for hypertension and rheumatoid arthritis patients. And, in a study using Elderhostlers as subjects, Stones, Stones, and Kozma (1987) found that those who were hardy showed faster reaction times.

Okun, Zautra, and Robinson (1988) examined correlations between objective health, perceived health, and hardiness, as assessed by the 50-item scale. They reported the control subcomponent to be a significant correlate of both percentage of circulating T-cells and perceived health in female rheumatoid arthritis patients. Solomon and Temoshok (1987) reported a positive significant relationship between a measure of hardiness and lymphocyte counts among AIDS patients.

In an experimental design using male undergraduates, blood pressure and heart rate were monitored while subjects performed a difficult task (Contrada, 1989). Hardiness, as
assessed through the five questionnaires used by Kobasa et al. (1982b), and Type-A behavior were examined as predictors of cardiovascular response. Results showed hardiness to be associated with reduced diastolic blood pressure. In addition, the Type-B, high hardiness group showed the least blood pressure reactivity. Further exploration suggested that the challenge subcomponent of hardiness accounted for the relationship to blood pressure reactivity.

In another experimental design, high and low hardy male undergraduates, as measured by the 36-item hardiness scale, were given a challenging task under high or low threat conditions (Allred & Smith, 1989). Hardy subjects endorsed more positive self-statements in the high threat condition and had higher levels of systolic blood pressure during the task. The latter finding was explained in terms of active coping.

Wiebe (1991) used an experimental design to look at physiological arousal of male and female undergraduates in response to a threatening task. High hardy subjects, as assessed by the five questionnaires used by Kobasa et al. (1982b), appraised the task as less threatening, and showed more positive and less negative affect than did low hardy subjects. High hardy men showed lower heart rates than did low hardy men; and men in a high hardiness appraisal condition showed lower levels of physiological arousal than
did men in the low hardiness appraisal condition. These effects were not found in women.

Most of the studies reviewed above showed relationships between hardiness and physical health or physiology, but showed no evidence that hardiness has a buffering or moderating effect on stress as related to health outcomes. As several writers have pointed out, evidence of an interaction between stress and hardiness would be required to support the moderating hypothesis (Funk & Houston, 1987; Hull et al., 1987; Roth et al., 1989; Westman, 1990; Wiebe, 1991). Kobasa and colleagues reported such an interaction in several studies (Kobasa et al., 1982a, 1982b; Kobasa & Puccetti, 1983). The moderation or buffering effect also has been reported in mixed-gender undergraduates (Wiebe & McCallum, 1986). Results of one study that tested subcomponents separately suggested that the control subcomponent of hardiness moderated the effects of job stress on systolic blood pressure and triglycerides in certain Type A subjects (Howard, Cunningham, & Rechnitzer, 1986). Other researchers failed to find a stress buffering effect of hardiness as related to physical health (Funk & Houston, 1987; Schmied & Lawler, 1986).

Hardiness and Psychological Health

Although hardiness originally was conceptualized as a moderator in the relationship between stress and physical
health, many researchers have used psychological health outcome measures. Kobasa (1982) published one article that used strain, defined as symptoms associated with overexertion of one's resources, as a dependent variable in a study of lawyers. The measure included such items as nervousness, anxiety, crying, and depression. Using stepwise regression analysis, she found commitment and life events to be related to, and predictive of, strain as hypothesized.

In a study of adult professionals, Nowack (1989), used measures of stress, hardiness, coping, and health habits as predictors of psychological distress and physical illness. Multiple regression analysis showed hardiness to be a significant predictor of psychological distress, but not of physical illness. An earlier study by Nowack (1986) examined the effects of hardiness and Type-A behavior on burnout and psychological distress in a sample of university employees. Hardiness was assessed by use of three scales selected by the author. Analyses of covariance revealed that hardy Type-As showed less burnout and psychological distress than less hardy Type-Bs. Nowack and Hanson (1983) had earlier reported a significant negative relationship between hardiness and emotional exhaustion in college residence assistants.

Depression also has been used as an outcome measure and has been shown to be related to hardiness (Funk &
Houston, 1987). Kuo and Tsai (1986) found that hardiness was related to depression in Asian immigrants to the United States. In support of the notion that hardiness moderates the effects of stress on health, stress and hardiness interactions in relation to psychological health have been shown in concurrent studies (Ganellen & Blaney, 1983; Kahn, 1987; Rhodewalt & Agustsdottir, 1984; Rhodewalt & Zone, 1989) and in prospective designs (Funk & Houston, 1987; Lang & Markowitz, 1986).

Several studies have explored the relationship between hardiness and burnout as an outcome of stress. Maslach (1976) has defined burnout as an outcome of stress characterized by self-perceptions of emotional exhaustion, cynicism, negativity, low commitment, fatigue, low morale, resistance, detachment, and low productivity.

As cited earlier in this section, Nowack (1986) found that hardy Type-A college employees experience significantly less burnout and psychological distress then their less hardy Type-B counterparts. Nowack and Hanson (1983) found hardiness to be significantly related to the severity of emotional exhaustion and the frequency and severity of depersonalization and personal accomplishment dimensions of burnout in college residence assistants.

In a study of elementary teachers, Holt et al. (1987) looked at stress, burnout, hardiness, and incidence of physical and mental illness. Results suggested that
teachers with high stress and low burnout are more hardy than those with high stress and high burnout.

Several studies have examined the relationship between hardiness and burnout in nurses. McCranie, Lambert, and Lambert (1987) assessed levels of hardiness (36-item version), perceived job stress, and burnout in a group of registered nurses. Multiple regression analyses suggested that hardiness and work stress are predictive of burnout, but do not interact. That is, hardiness was not found to be a moderator of stress on burnout.

Topf (1989) conducted a similar investigation of hardiness (assessed by five scales), stress, and burnout in critical care nurses. This researcher found that commitment accounted for significant amounts of variance in burnout. Again, there was no support for a stress moderating or buffering effect of hardiness. A third study of nurses (Rich & Rich, 1987) reached similar conclusions. Rich and Rich found that 25% of the variance of burnout could be accounted for by hardiness (assessed by five scales); however, no moderating effect was found.

A wide range of outcomes has been reported to be related to hardiness including marital adjustment (Barling, 1986), performance of military and police cadets (Westman, 1990; Herlich, 1985, respectively), activity level of senior citizens (Magnani, 1986), and psychological health of disaster workers (Bartone, Ursano, Wright, & Ingraham,
Widespread interest in the hardiness concept has generated studies in the United Kingdom (Parkes & Rendall, 1988), Japan (Nakano, 1990a, 1990b), Israel (Westman, 1990), Canada (Hannah & Morrissey, 1987) and Australia (Pierce & Molloy, 1990); results have been consistent with findings in the United States. Modified hardiness scales have been developed for use with adolescents (Morrissey & Hannah, 1987), older adults (McNeil, Kozma, Stones, & Hannah, 1986) and those with chronic health problems (Pollock & Duffy, 1990).

Critique of Hardiness

The general body of research on hardiness has several weaknesses or areas to be further explored. These include: use of several different instruments to measure hardiness across the published research; confusion regarding whether hardiness is a uni- or multi-dimensional construct; appropriateness of statistical testing; and inconsistent relationships between hardiness and various demographic variables.

Measurement of hardiness. As several writers have pointed out, summaries and generalizations across the hardiness literature have been complicated by the use of different versions of the hardiness scale (Funk & Houston, 1987; Hull, Van Treuren, & Virnelli, 1987; Orr & Westman, 1990). As described above, Kobasa (1979) originally performed discriminant analyses to identify which of 19
personality scales were to be used as hardiness measures. In subsequent research, a 71-item instrument made up of the five scales described earlier in this review was used to measure hardiness (Kobasa et al., 1981, 1982b, 1983; Kobasa & Puccetti, 1983). Some researchers then began to use a 20-item version (Rhodewalt & Agustsdottir, 1984) or a 36-item version (Hull et al., 1987), citing personal communications with Kobasa and Maddi as their sources for the scale.

In their review of the hardiness literature, Orr and Westman (1990) report that the 20-item and 36-item versions were made up of items that had the highest factor loadings in the factor analysis of the original 71-item version. Later, a 50-item version was developed to overcome the criticisms that the earlier scale was phrased for executives and was keyed negatively to indicate lack of hardiness. Using data reported in various hardiness studies, Orr and Westman (1990) reported that internal consistency and stability over time are acceptable across all versions ($\alpha = 0.67$ to 0.90; $r = 0.60$ to 0.89). They also reported acceptable agreement between the longer scale and each of the three shorter ones ($r = 0.76$ to 0.89).

As evidence for validity, these authors offered the observation that the four versions are very similar in their relationships to constructs of negative and positive
affect, and to Type-A personality. They noted that few studies have reported the relationship between demographic variables and hardiness and that these results have been inconsistent and inconclusive. Based on the information available to them across published hardiness research, Orr and Westman concluded that the various hardiness instruments measure the same construct with acceptable reliability and stability. Review of the literature revealed no publications by Kobasa or Maddi in regard to psychometric data or development of the latter three versions. Therefore, questions remain as to how these instruments were developed.

**Hardiness construct.** Another question that has arisen in regard to hardiness research is whether or not hardiness should be considered a unitary construct (Hull et al., 1987; Carver, 1989; Orr & Westman, 1990). As Carver (1989) and others have pointed out, Kobasa's original study in 1979 showed that the three subcomponent measures did not predict outcome equally. However, Kobasa's subsequent research measured each subcomponent separately and combined them into a composite hardiness score, thereby giving them equal weights. Unfortunately, while there is gain in simplicity in such an approach, there is a loss in ability to explain inconsistent results across studies or to determine what aspect(s) of the composite is(are) responsible for observed effects. The question also is a
theoretical one, since there is lack of clarity as to whether hardiness is a single construct assessed indirectly by the subcomponent scores (latent variable approach), or whether each subcomponent interacts with the others and hardiness is more than the sum of its parts (synergistic approach) (Carver, 1989).

Although the original introduction of hardiness by Kobasa (1979) seems to imply synergism, most researchers have used a composite score based on all three of the subcomponents (control, challenge, and commitment). Others have used subcomponent scores and have found inconsistent results. Several studies have shown that only control and commitment contributed to the hardiness effects (Kobasa, 1982b; Manning et al., 1988; Okun et al., 1988; Pierce & Molloy, 1990; Rich & Rich, 1987). Ganellen and Blaney (1984) reported that commitment and challenge subcomponents were responsible for an observed effect in their study, while only commitment moderated stress. Other researchers have found that observed effects were related only to the control dimension (Holt et al., 1987; Howard et al., 1986; Okun et al., 1988; Schmied & Lawler, 1986), or only to the challenge subcomponent (Contrada, 1989). Reviews by Hull et al. (1987), Carver (1989), and Orr and Westman (1990) suggest that there is a need to further explore potential differential and interactive effects for the three subcomponents rather than using only a composite score.
Statistical testing. A related issue is how the hardiness construct should be tested statistically. If the assumption is that the three subcomponents interact with each other to produce an effect on health, then the interactions between the subcomponents should be examined (Carver, 1989; Orr & Westman, 1990). Many of the hardiness studies have used analysis of variance or covariance, requiring continuous variables (such as hardiness or stress) to be categorized. Multiple regression techniques would seem to be more appropriate, especially when variables correlated to hardiness (stress, social support) are used as independent variables (Funk & Houston, 1987). Recent studies frequently use regression models; however, none to date have examined interactions among the subcomponents.

Hardiness and demographics. In regard to the relationship between demographic variables and hardiness, Kobasa et al. (1981), using male subjects, reported that hardiness was unrelated to age, education, and job level. However, subsequent research has reported inconsistent results in regard to age and level of education. Positive correlations between age and hardiness have been found (Hannah & Morrissey, 1987; Kobasa, 1982; Nowack, 1986; Rich & Rich, 1987; Schmied & Lawler, 1986). Positive correlations between educational level and hardiness also have been found (Pollock, 1986; Schmied & Lawler, 1986).
There have been few published studies that have examined gender differences in relationship to hardness, since most have used one-gender, or predominately one-gender samples. Since several different versions of the hardness scale have been used, comparing results across studies and gender is difficult.

In studies of older adults (Stones et al., 1986), employed professionals (Nowack, 1989), and the chronically ill (Pollock, 1986), in which the samples included both men and women, men were found to have significantly higher scores on hardness than women. Hannah and Morrissey (1987) reported higher hardness scores in female adolescents. No differences were observed between males and females in regard to hardness in other studies (Banks & Gannon, 1988; Parkes & Rendall, 1988; Rhodewalt & Agustsdottir, 1984).

In a study of mothers, MacEwen and Barling (1988) found no moderating effect of hardness on interrole conflict as related to marital adjustment; this is in contrast to a similar study of fathers in which a moderating effect was found (Barling, 1986). Similarly, Nakano (1990a, 1990b) found a main effect for hardness on health for men, but no main effect of hardness in a study of women. Schmied and Lawler (1986), found no support for the hardness moderator hypothesis in their study of female
secretaries. The first study to make a direct comparison of hardiness effects across gender (Wiebe, 1991) supported a moderating role of hardiness on physiological arousal for men, but not for women. These inconsistent results have led to discussions by some authors that suggest the present hardiness model may be more limited in its usefulness for studying women (Kobasa, 1987; Lambert & Lambert, 1987; MacEwen & Barling, 1988; McCranie et al., 1987; Rhodewalt & Zone, 1989).

Summary

In summary, the relationship between life stress and physical and psychological health outcomes has been well-documented. However, the variance in illness accounted for by stress is small, and there are wide individual differences in response to stress. There is evidence that acute life events and chronic stressors have independent effects on well-being. Several variables have been considered as moderators of the effect of stress on health. These variables include social support, sex roles/socialization, Type A personality, locus of control, and the hardy personality, a constellation of control, commitment, and challenge. Hardiness and its components are the primary focus of the present study.

The body of hardiness research generally supports a relationship between hardiness and physical health outcomes. Support for a moderating effect of hardiness on
the stress-health relationship, shown by interactions between stress and hardiness, is weaker. For psychological outcomes, support for a hardiness and health relationship and for hardiness as a moderator of stress is substantial, for a wide variety of populations and outcome measures.

The hardiness research has been criticized, however. For example, several derivations of the original hardiness instrument have been used in recent years, and there is little published psychometric information available in regard to the various versions. Another problem is that, until recently, hardiness studies primarily used analysis of variance statistical techniques rather than multiple regression techniques, which are more appropriate when continuous variables and correlated predictor variables are examined. Most of the studies have used a composite hardiness measure in which control, commitment, and challenge have been considered additively, even though there is evidence that the three may have differential effects. Some studies have considered these subcomponents separately; none have considered the possibility that the subcomponents have an interactive effect. Another problem has been the inconsistent relationships among hardiness, stress, and illness in studies with female subjects.
Purpose and Hypotheses

In order to try to clarify some of the issues presented above, the present study measured hardiness by using the original five scales selected by Kobasa and colleagues through discriminant analysis, rather than using any of the hardiness instruments that were later derived. Multiple regression methods were used to analyze data.

The first objective of the present study was to evaluate whether or not control, challenge, and commitment, as theoretically and operationally defined by Kobasa (1979), act in a synergistic (interactive) manner in relationship to symptomatology. The published research to date has considered hardiness to be a latent variable (Carver, 1989), with the three components acting additively. (Hypothesis 1: Control, commitment, and challenge act in a multiplicative manner in predicting illness.)

If the currently used (additive) model of hardiness is valid, there are many inconsistencies in previous hardiness research. Review of the literature suggests that results of studies examining the relationship between hardiness and health began to be inconsistent when mixed-gender and female samples were introduced, especially in regard to moderator effects and the predictive value of subcomponents. Few hardiness studies have examined gender differences. Therefore, the second objective of the
present study was to look at the hardiness effect across gender, looking specifically at possible moderator effects and differential effects of control, commitment, and challenge. Based on previous research, hardiness, as currently conceptualized (additive model), was not expected to play a moderating role for women. (Hypothesis 2: In women, stress and hardiness do not interact in their effects on illness.) Furthermore, the studies of women’s roles and stress suggest that low control and high commitment may contribute to illness. (Hypothesis 3: In women, both low control and high commitment are predictive of symptomatology.)

METHOD

Subjects

Subjects were 75 male and 75 female undergraduate students enrolled in psychology courses at the University of North Texas in Denton. The average age was 20.2 years and the majority were not married (95%). The students earned extra credit by participation in this research.

Procedure

Subjects completed a set of questionnaires in large group meetings. They were told by the researcher that the purpose of the questionnaires was to gather information about coping. They were assured that their participation was voluntary, that responses would be kept confidential, and that debriefing was available (see Appendix A).
Information regarding the extra credit process was provided, questions were answered, and subjects were allowed to complete the measurements at their own pace. All students completed the process in less than two hours.

Measures

Since various measures of stress and illness have been used in hardiness research, making generalizations across the literature difficult, both acute life events and chronic stressors and both physical and psychological illness were measured in the present study. Acute life events, chronic stressors, and hardiness (and its subcomponents) were considered as predictor variables. Psychological and physical symptoms and psychological distress were considered as outcomes, or criterion variables.

Stress

The Life Experiences Survey (LES) (Sarason, Johnson, & Seigel, 1978), a 57-item questionnaire, was used to measure acute life events. Students were asked to indicate which events had occurred in their lives over the past month and to rate the degree of impact of each experienced event on a 7-point scale (extremely negative to extremely positive impact). The total negative event score (the number of experienced events rated negatively) was used as a measure of negative life events. The
specification of negative events was based on evidence that negative events are more strongly related to health outcome measures than events reflecting general life change (Crandall & Lehman, 1977; Mueller et al., 1977; Ross & Mirowsky, 1979). The reliability coefficient for the negative change score of the LES is 0.88. Significant correlations between the negative change score and measures of trait anxiety ($r = 0.29$), state anxiety ($r = 0.46$), grade point average ($r = -0.38$), depression ($r = 0.24$), and locus of control ($r = 0.32$) have been reported (Sarason et al., 1978).

The Hassles Scale (Kanner et al., 1981) was used to measure daily living hassles related to work, family, friends, etc. Students were asked to select hassles that they had experienced during the previous month. The sum of hassles was used as a measure of chronic life stressors. Test-retest reliability is adequate for hassles scores ($r = 0.68$), and hassles have been shown to be more strongly associated with adaptational outcomes than life events and to operate independently of life events (Kanner et al., 1981). Items from this scale or the LES that were confounded with the content of measures of symptoms were dropped.

**Hardiness**

As in early hardiness research (Kobasa et al., 1983), commitment was measured by the Alienation from Self and
Alienation from Work Scales of the Alienation Test (Maddi et al., 1979). Across various samples, these two scales have shown average internal consistency (Cronbach's alpha = 0.85 and 0.79, respectively) and test-retest reliability of 0.77 and 0.70, respectively.

Control was measured by the Locus of Control scale (Rotter, 1966) and the Powerlessness scale of the Alienation Test (Maddi et al., 1979). For locus of control, measures of internal consistency have ranged from $r = 0.65$ to $r = 0.79$. Test-retest reliability measures have ranged from $r = 0.60$ to $r = 0.83$ (Rotter, 1966). Lower scores represent an internal locus of control. The powerlessness measure shows an average internal consistency (alpha = 0.88) and a stability correlation of 0.71 (Maddi et al., 1979).

Challenge was measured by the Security scale of the California Life Goals Evaluation Schedule. Psychometric data are not available for the Security scale. However, measures of internal consistency of the whole schedule have been reported, with coefficients ranging from 0.82 to 0.98. Test-retest coefficients for the schedule have ranged from 0.71 to 0.86 (Hahn, 1966).

Following the procedure established by Kobasa et al. (1982, 1983), the score from each scale was converted to a standard z score. Z scores for the two scales measuring commitment were summed, as were those for the two scales
measuring control. The z score for challenge was doubled since there was only one scale. To obtain a composite hardiness measure, summed z scores for each component were added together. An important point is that all scales are negative indicators of hardiness; that is, the higher the hardiness score, the less hardiness one possesses. Kobasa (1982) reported a stability correlation of 0.61 over a five-year period for the composite score.

Illness

Psychological distress was assessed by the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). The measure consists of 58 items that factor into anxiety, depression, somatic-complaints, interpersonal sensitivity, and compulsive thoughts. Students were asked to endorse all symptoms experienced in the last month and rate the degree of distress. Both a frequency count of psychological symptoms and a global psychological distress score were calculated for each student. Moderately high internal consistency (Cronbach’s alpha = 0.86) and test-retest reliability (0.75) have been reported for this scale (Derogatis et al., 1974).

Physical symptomatology was assessed by the Seriousness of Illness Rating Scale (Wyler et al., 1968), which is a checklist of commonly recognized physical symptoms and diseases. Each item has a predetermined severity rating obtained from ratings by physicians and
laypeople. Rank-order correlations (Spearman's rho) have been high between ratings by two separate samples of physicians (0.98) and between samples of physicians and laypeople (0.94). Comparisons of ratings by Irish, Spanish, and American laypeople also showed high correlations (0.90 or higher). Students were asked to endorse symptoms on the checklist that they had experienced in the past month. Severity weights were summed across endorsed items to compute a physical illness score for each student. This scale has been widely used as a tool in stress and illness studies (Dohrenwend & Dohrenwend, 1974).

RESULTS

Descriptive statistics for each measurement are shown in Table 1 (Appendix B) for the entire sample and for gender subsamples. Correlation matrices showing relationships among the variables are shown in Tables 2 and 3 (Appendix B). Multivariate analyses of variance (MANOVA) was performed to test for differences in group means of all predictor and criterion variables across gender. Results showed that women, as compared to men, had higher levels of commitment ($F(1, 148) = 6.16, p < .05$) and lower levels of challenge ($F(1, 148) = 9.62, p < .01$). Women also reported more psychological symptoms ($F(1, 148) = 11.05, p < .01$) and more severe physical illness ($F(1, 148) = 4.53, p <$
To test the first hypothesis, a series of three stepwise multiple regression analyses was performed. Frequency of hassles and of negative life events were entered as predictor variables, along with an interaction term representing synergism between the hardiness subcomponents (control X commitment X challenge). Frequency of psychological symptoms, total psychological distress, or severity of physical illness was entered as the criterion variable.

The interaction term did not emerge as a significant predictor variable in any of the three analyses. Hassles and negative life events emerged as predictors of both measures of psychological symptomatology, and negative life events was a predictor of physical illness. The same analyses also were performed on gender samples with the same results; the interaction term did not emerge as a significant predictor of psychology or physical symptomatology for males or females.

To test for the possibility that any two of the three subcomponents could act synergistically in producing effects, three interaction terms representing these effects also were entered as predictors (control X commitment, control X challenge, commitment X challenge). None of the interaction terms was a significant predictor, whether the mixed-gender sample or single-gender subgroups were analyzed.
Since the possibility existed that the latent variable model of hardiness also was unrelated to health in this particular sample, measures of control, commitment, and challenge were added together, according to Kobasa's (1979) original model of hardiness, and entered along with hassles and negative life events as a predictor variable in three stepwise multiple regression analyses. Again, either the measure of psychological symptoms, psychological distress, or physical illness was entered as the criterion variable. As shown in Table 4 (Appendix B), when the mixed-gender sample was analyzed, hardiness emerged as a significant predictor of both frequency of psychological symptomatology and severity of physical illness, but it did not predict severity of psychological distress.

Several important gender differences appeared when hardiness (additive model) was included as a predictor variable and gender subgroups were analyzed separately. As shown in Table 5 (Appendix B), when stepwise multiple regression was applied to the male sample, hassles and hardiness were found to be significant predictors of frequency of psychological symptoms, accounting for 27% of the variance. For psychological distress, hassles and negative life events accounted for 77% of the variance. For physical illness, only hardiness emerged as a predictor, accounting for 6% of the variance. For the female sample, hassles and negative life events were
predictive of psychological symptoms, accounting for 25% of the variance (see Table 6, Appendix B). For psychological distress (29% of the variance) and for physical illness (22% of the variance), hassles and hardiness were predictive for females.

To further evaluate gender differences and test the second hypothesis, interaction terms representing relationships between hassles, negative life events, and hardiness were entered as a second block of predictor variables in the stepwise regressions. A significant interaction term involving the hardiness variable and either stressor variable would suggest a moderator role for hardiness in the effect of stress on health. For males, the results showed the interaction term, hardiness X hassles, to be a significant predictor of psychological symptoms, with combined predictors accounting for 37% of variance (see Table 5, Appendix B). The same interaction term emerged as a predictor of psychological distress; the two stress measures and this interaction accounted for 91% of the variance of this outcome measure. There was no evidence of a moderating effect of hardiness for physical illness.

As hypothesized, for the female sample, there was no evidence that hardiness moderated the effects of stress for either psychological or physical health; no interaction term involving hardiness was found to be a significant
predictor (see Table 6, Appendix B). However, the interaction term, negative life events X hassles, accounted for additional variance in physical illness (total 28% variance with other predictors).

To test the third hypothesis, control, commitment, and challenge were entered as predictors in stepwise multiple regressions, along with negative life events and hassles. As before, psychological symptoms, psychological distress, and physical illness each was considered as a criterion variable. For the males, hassles and control accounted for 24% of the variance of psychological symptoms. None of the subcomponents singularly predicted psychological distress or physical illness (see Table 7, Appendix B). For the female sample, hassles, control, and negative life events accounted for 32% of variance of psychological symptoms (see Table 8, Appendix B). Hassles and commitment accounted for 32% of the variance of psychological distress. Along with hassles, commitment emerged as a predictor of physical illness in women; together, these variables accounted for 25% of total variance.

DISCUSSION

The results of the present study suggest that control, commitment, and challenge act in an additive manner in their relationship to illness symptomatology, and that there is no evidence of a multiplicative, or synergistic, relationship among these variables. The results suggest,
then, that the personality construct hardiness is a latent variable, with control, commitment, and challenge each partially reflecting a single underlying quality (Carver, 1989). These results also support the common practice, originated by Kobasa (1979), of adding together measures of control, commitment, and challenge to represent hardiness.

Other indirect support for the latent variable, or additive, model was shown in the data from the male sample. No single subcomponent emerged as a predictor of psychological distress or physical illness in males, even though a composite hardiness interaction term was a significant predictor for psychological distress, and composite hardiness was a significant predictor for physical illness in the same subjects (see Table 5 and Table 7, Appendix B).

The data suggest that potential effects of single subcomponents should continue to be explored. In males, hardiness emerged as a predictor of psychological symptoms, with hardiness and hassles accounting for approximately 27% of this criterion. When subcomponents were considered separately, however, hassles and control accounted for 24% of the variance of psychological symptoms (see Table 6, Appendix B). This suggests that in the male subsample, most of the predictive value of hardiness for this criterion was in the control subcomponent.
For men, this study suggests that hardiness acts as a moderator of stress for psychological health. The interaction between hardiness and life hassles was a significant predictor for both psychological symptoms and psychological distress. However, hardiness showed a direct effect only for physical illness. These findings are consistent with the literature review and conclusions of writers such as Orr and Westman (1990) suggesting that previous hardiness research has shown good support of hardiness as a predictor of psychological and physical outcomes, fairly strong support of hardiness as a stress moderator in relation to psychological health, and mixed findings in regard to hardiness as a stress moderator in relation to physical health.

In contrast, as hypothesized, the present study showed no moderation effects of hardiness for women, even though hardiness emerged as a direct predictor of both psychological distress and physical illness in the same subjects. It is possible that moderator effects might have been found in a sample of women more comparable to the middle-class white executives used in the original hardiness research. However, this argument is weakened by the finding that moderator effects were present in the college male subgroup of the study.

Even though there is no evidence of a moderator effect of composite hardiness for this female sample, any of the
subcomponents could have acted as moderator variables. To test this possibility, interaction terms representing relationships between each subcomponent measure and each stress measure were included as predictors, along with hassles and negative life events, in a series of post hoc stepwise multiple regression analyses. None of these interaction terms emerged as a predictor of psychological or physical health. The present results are consistent with other hardiness studies using female samples, which failed to find a hardiness moderator role (Schmied & Lawler, 1974; McCranie et al., 1987; Rich & Rich, 1987; Topf, 1989; Wiebe, 1991). In the only published study designed to look at hardiness across gender, Wiebe (1991) found that hardiness was a more effective stress moderator among men than among women.

As Wiebe (1991) suggests, hardiness may be associated with a coping style that is more typical and/or more beneficial for men than for women. Another possibility is that this gender difference is related to measurement bias. Selection of scales to assess hardiness was based on discriminant analysis applied to data from men (Kobasa, 1979). Whether or not data from women has been included in development of newer versions of the hardiness scale is unknown, since psychometric information has not been published for these versions.
Results of the present study also suggest that individual subcomponents of hardiness may be as predictive of health in women as the composite hardiness. For example, although hardiness did not emerge as a predictor of psychological symptoms, control did emerge. Along with hassles and negative life events, the control subcomponent accounted for 32% of the variance of this variable. Commitment emerged as a predictor of psychological distress; in fact, commitment and hassles accounted for at least as much variance (32%) as did composite hardiness and hassles (29%) (see Table 6 and Table 8, Appendix B). A similar pattern showed when physical illness was the criterion. These results suggest that, for women, control and commitment subcomponents are more important predictors of psychological and physical outcomes than composite hardiness.

The results of this study show only partial support of the expected relationships of control and commitment to illness in women. The hypothesis was that lower control and higher commitment would be related to higher levels of illness in women. Lower control was found to be related to higher levels of psychological symptoms. However, the data showed that lower levels of commitment were related to higher levels of both psychological distress and physical illness, a finding inconsistent with the hypothesis, but consistent with the present conceptualization of hardiness.
One possibility is that the predicted relationship between commitment and health might have been demonstrated in an older female sample. For college age women, gender roles may not yet encourage the overcommitment that was expected in this study. It is interesting that even in this college age sample, women showed significantly higher levels of commitment than men. Another possible explanation for the results is: it is not high levels of commitment or involvement per se that are unhealthy for women, but the types of activities to which they are committed (Wethington et al., 1987).

Other results of this study are consistent with previous research. For example, a number of researchers have reported that relatively minor life events consistently contribute above and beyond acute life events in predicting symptomatology (Banks & Gannon, 1988; DeLongis et al., 1982; Kanner et al., 1981; Reich & Zautra, 1983). In the present study, hassles were significant predictors of psychological symptoms, psychological stress, and physical illness for both males and females, generally accounting for more variance than acute life stressors. These findings underscore the importance of using both types of measures of stress in investigations of stress and illness.

The present findings in regard to possible differential effects of control, commitment, and challenge
also are consistent with previous research. In the present study, challenge did not emerge as a predictor of any of the health outcome measures for males or females. Hull et al. (1987) in their review of hardiness research, suggested that the current measure of challenge is not a reliable contributor to the prediction of health outcomes and recommended that researchers concentrate on control and commitment. But, Contrada (1989), using an experimental design, found an association between the measure of challenge and physiological arousal. He suggested that the association was consistent with the construct meaning of challenge and recommended trying to improve the measure of challenge.

There was one unexpected finding in the present study. In the male subsample, a very large proportion of the variance (91%) of the psychological distress outcome measure was accounted for by hassles, negative life events, and the interaction term hardiness X hassles. In fact, hassles alone accounted for 70% of the variance of psychological distress (see Table 5, Appendix B). There are at least two possible explanations for these surprising findings. One is that this is a chance occurrence in this particular group that would not be replicated. Another explanation is related to current hypotheses regarding how the effects of hardiness are mediated.
A possible mechanism or process by which hardiness affects outcomes is through perception or appraisal of events. Several studies have suggested that hardy individuals appraise events as less stressful than nonhardy individuals (Rhodewalt & Agustsdottir, 1984; Rhodewalt & Zone, 1989; Westman, 1990; Wiebe, 1991). For example, low hardy individuals rate the same life events as less positive and controllable than do high hardy individuals (Rhodewalt & Agustsdottir, 1984). In the present study, the measure of psychological distress was obtained by having students rate their level of distress for each psychological symptom recently experienced. Perhaps low hardy individuals, as compared to high hardy individuals, not only appraise life events as less positive, but also appraise their psychological symptoms as being more distressing. Thus, the confounding factor for psychological distress in this study may have been appraisal, increasing the probability of strong relationships between predictor and criterion variables.

If this explanation is accurate, then the question is whether or not all the hardiness research data from self report are subject to this type of confounding. A recent study has provided important data related to this issue. Wiebe (1991) presented subjects with a threatening task in an experimental design that manipulated appraisal of the task. She found that men in high hardiness appraisal
conditions showed lower levels of physiological arousal than did those in the low hardiness appraisal conditions. (The same effect was not found in women.) Wiebe’s study, as well as others using objective physiological outcomes (Allread & Smith, 1989; Contrada, 1989; Okun et al., 1989), eliminated reporting-style confounds between predictor and criterion variables. The study also provided additional evidence that appraisal is an important part of the effect of hardiness.

Limitations of Present Research

As in all survey research, the results of the present study must be interpreted with caution due to possible method variance. Since all data are correlational and were gathered through self-report indices collected at a single point in time, the results do not demonstrate causal effects in regard to the relationship among hardiness, the subcomponents, stress, and health. Although the results point to important relationships among these factors, it is possible, for example, that health status may instead have an effect on the way that individuals perceive themselves or on how they evaluate their stress. There is some evidence available, from studies using prospective (predictive) research designs, supporting a causal relationship among variables similar to those variables examined in the present research (Banks & Gaman, 1988; Herlich, 1985; Kobasa et al., 1981, 1982, 1985; Wiebe &
McCallum, 1986). In these studies, hardiness measures were taken at Time 1, and stress and illness measures were taken at various time intervals afterward. Studies using objective physiological outcome measures also have supported a causal relationship between hardiness and health (Allread & Smith, 1989; Contrada, 1989; Okun et al., 1989; Wiebe, 1991).

The present results also should be evaluated with a possible measurement problem in mind. As Funk and Houston (1987) noted, the measures of hardiness used in the present study are indirect and negative indicators and call for assumptions that may be inaccurate. For each of the scales used to measure hardiness, a low score is interpreted as an indicator of high control, commitment, or challenge. However, a low score on, for example, the Security Scale may represent neutrality or something other than high challenge. Apparently, later versions of the hardiness scale use positive and direct measures (see Orr & Westman, 1990, for review).

Future Research

Results of this study suggest several areas that need to be further explored. In women, individual subcomponents were responsible for at least as much variance of outcomes as composite hardiness (see Tables 6 and 8, Appendix B). This may be a result of measurement bias related to the use of data from men in the development of the hardiness
measure. Another possibility is that the hardiness construct may involve a coping style that is more appropriate and/or effective for men than for women. In order to clarify this issue, normative data from women should be included in development of the hardiness measurement. (Later versions of the hardiness scale may have included such data; however, in the absence of published psychometric information, this is speculative.) Research focusing on women also could reveal coping styles that are more effective for women than hardiness.

In men, one subcomponent (control) was responsible for much, but not all, of the variance accounted for by hardiness in relation to psychological symptoms. This finding leads to speculation that perhaps control, commitment, and challenge should be given differential weightings in composite hardiness, depending on the population and/or outcome measure. It is interesting that in the present study there was no significant difference in hardiness across gender; however, women showed significantly higher levels of commitment and lower levels of challenge than men.

If hardiness is thought of as a latent variable (Carver, 1989), with control, commitment, and challenge each partially reflecting the underlying construct, then one subcomponent may not be sufficient to predict symptomatology. However, a certain level of each
subcomponent could be necessary for the hardiness effect. Systematic evaluation of the predictive contributions of each subcomponent is needed.

Appraisal has been proposed as a possible mechanism for the effects of hardiness. A future research possibility is to design a study that controls for appraisal. If there still are hardiness effects, this would suggest that there are other mechanisms at work, such as the tendency toward action that Kobasa (1979) proposed.

As in all survey research, results of this study need to be confirmed through prospective (predictive) designs and use of objective health outcomes. Also, the assumptions required by the use of indirect and negative indicators of hardiness should be subjected to empirical testing. In addition, possible nonlinear relationships among variables should be explored.

Conclusion

In summary, the present study suggested that control, commitment, and challenge acted in an additive manner, each partially reflecting the hardiness construct, to influence psychological and physical well-being. There was no support for a synergistic, or multiplicative, relationship among control, commitment, and challenge in relation to symptomatology. For men, low hardiness (additive model) was predictive of higher levels of psychological symptoms and physical illness. Also for
men, composite hardiness acted as a moderator of chronic stressors in relation to psychological symptoms and psychological distress. For women, low hardiness was predictive of higher levels of psychological distress and physical illness. However, the results suggest that, for women, the effects of hardiness, as measured in this study, were due to the commitment subcomponent. For women, neither hardiness nor any of its subcomponents had moderator effects in this study. Whether the gender differences shown are due to measurement bias, or to the inadequacy of the construct for women, is not clear. Further research is needed to clarify the issue.
TO THE PARTICIPANT:

This is a study designed to examine coping with stress. The data will be used to clarify existing research regarding stress, and to add to the body of knowledge that may help us all to enhance our ability to cope with stress.

You will be asked to complete several questionnaires which you can complete during this session. There is no foreseeable risk to you, psychologically, socially, or physically. You are free to discontinue participation in the study at any time. After you complete the questionnaires today, your name will be recorded and your participation in the research will be verified to your psychology instructor so you can be awarded extra credit.

You are NOT to write your name on the questionnaires. This is neither required nor needed, since only summary data will be used in the analysis. If you would like to receive a summary of the research findings, please provide appropriate information to the researcher before leaving today, so that you may be contacted when the research is completed.

Thank you for your participation. If you have any questions or problems connected with participation in the study, please contact Judy Embry, M.S., or Jack Haynes, Ph.D., in the Psychology Department at UNT, 565-2671.

PLEASE READ THE DIRECTIONS FOR EACH QUESTIONNAIRE CAREFULLY. EACH ONE USES A DIFFERENT SCALE OR METHOD FOR SUPPLYING RESPONSES.

THIS PROJECT HAS BEEN REVIEWED BY UNIVERSITY OF NORTH TEXAS COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (817/565-3940).
Table 1

Means and Standard Deviations for Predictor and Criterion Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample (N = 150)</th>
<th>Male Subsample (n = 75)</th>
<th>Female Subsample (n = 75)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Negative life events</td>
<td>4.03</td>
<td>3.69</td>
<td>4.24</td>
</tr>
<tr>
<td>Hassles</td>
<td>41.73</td>
<td>39.31</td>
<td>41.70</td>
</tr>
<tr>
<td>Control&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.00</td>
<td>1.65</td>
<td>.16</td>
</tr>
<tr>
<td>Commitment&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.00</td>
<td>1.73</td>
<td>.35</td>
</tr>
<tr>
<td>Challenge&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.00</td>
<td>2.00</td>
<td>-.50</td>
</tr>
<tr>
<td>Hardiness&lt;sup&gt;a&lt;/sup&gt; (Composite)</td>
<td>.00</td>
<td>3.69</td>
<td>.01</td>
</tr>
<tr>
<td>Psychological Symptoms</td>
<td>23.23</td>
<td>14.51</td>
<td>19.36</td>
</tr>
<tr>
<td>Psychological Distress</td>
<td>97.23</td>
<td>56.72</td>
<td>95.31</td>
</tr>
<tr>
<td>Physical Illness</td>
<td>199.88</td>
<td>176.06</td>
<td>169.23</td>
</tr>
</tbody>
</table>

<sup>a</sup>This measure is the sume of z scores for two or more scales, following the procedure established by Kobasa, Maddi, and Kahn (1982).

<sup>b</sup>This measure is the doubled z score for the Security scale, following the procedure established by Kobasa, Maddi, and Kahn (1982).
Table 2

Correlation Matrix for Predictor and Criterion Variables (Males and Females)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Negative life events</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hassles</td>
<td>.62**</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Control</td>
<td>.13</td>
<td>.27**</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Commitment</td>
<td>.30**</td>
<td>.38**</td>
<td>.63**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Challenge</td>
<td>.14</td>
<td>.01</td>
<td>.03</td>
<td>.01</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. Hardiness (Composite)</td>
<td>.27**</td>
<td>.29**</td>
<td>.76**</td>
<td>.76**</td>
<td>.56**</td>
<td>1.00</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. Psychological Symptoms</td>
<td>.36**</td>
<td>.38**</td>
<td>.35*</td>
<td>.23*</td>
<td>.09</td>
<td>.31**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Psychological Distress</td>
<td>.78**</td>
<td>.78**</td>
<td>.17</td>
<td>.37**</td>
<td>.04</td>
<td>.27</td>
<td>.38**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>9. Physical Illness</td>
<td>.21*</td>
<td>.11</td>
<td>.29**</td>
<td>.29**</td>
<td>.04</td>
<td>.29**</td>
<td>.47**</td>
<td>.20*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p < .05, one-tailed; **p < .01, one-tailed
# Table 3

**Correlation Matrices for Predictor and Criterion Variables for Male Subsample and Female Subsample**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males (n = 75)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Negative life events</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Hassles</td>
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<td>1.00</td>
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<td></td>
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</tr>
<tr>
<td>3. Control</td>
<td>.06</td>
<td>.23</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4. Commitment</td>
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<td>.44**</td>
<td>.58**</td>
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<tr>
<td>5. Challenge</td>
<td>.06</td>
<td>-.03</td>
<td>.06</td>
<td>.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Hardiness (Composite)</td>
<td>.21</td>
<td>.32*</td>
<td>.78**</td>
<td>.78**</td>
<td>.51**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Psychological Symptoms</td>
<td>.39**</td>
<td>.43**</td>
<td>.34*</td>
<td>.34*</td>
<td>.18</td>
<td>.42**</td>
<td>1.00</td>
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</tr>
<tr>
<td>8. Psychological Distress</td>
<td>.76**</td>
<td>.84**</td>
<td>.09</td>
<td>.39**</td>
<td>.05</td>
<td>.27</td>
<td>.44**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>9. Physical Illness</td>
<td>.17</td>
<td>-.10</td>
<td>.20</td>
<td>.19</td>
<td>.10</td>
<td>.24</td>
<td>.42**</td>
<td>.08</td>
<td>1.00</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Females (n = 75)</strong></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Negative life events</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hassles</td>
<td>.48**</td>
<td>1.00</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Control</td>
<td>.21</td>
<td>.41**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Commitment</td>
<td>.31*</td>
<td>.31*</td>
<td>.70**</td>
<td>1.00</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Challenge</td>
<td>.27*</td>
<td>.01</td>
<td>.05</td>
<td>.12</td>
<td>1.00</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6. Hardiness (Composite)</td>
<td>.38**</td>
<td>.31*</td>
<td>.75**</td>
<td>.78**</td>
<td>.63**</td>
<td>1.00</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7. Psychological Symptoms</td>
<td>.41**</td>
<td>.44**</td>
<td>.43**</td>
<td>.27*</td>
<td>-.07</td>
<td>.26</td>
<td>1.00</td>
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<td></td>
</tr>
<tr>
<td>8. Psychological Distress</td>
<td>.42**</td>
<td>.47**</td>
<td>.46**</td>
<td>.44**</td>
<td>.01</td>
<td>.39**</td>
<td>.45**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>9. Physical Illness</td>
<td>.38**</td>
<td>.39**</td>
<td>.31*</td>
<td>.29*</td>
<td>.06</td>
<td>.28*</td>
<td>.48**</td>
<td>.52**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*E < .05, one-tailed; **E < .01, one-tailed
Table 4

Stepwise Multiple Regression Analyses with Hassles, Negative Life Events, and Hardiness as Predictors (Males and Females)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Step</th>
<th>Predictor</th>
<th>Multiple R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>$R^2_2$&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.38</td>
<td>0.14</td>
</tr>
<tr>
<td>Symptoms</td>
<td>2.</td>
<td>Hardiness</td>
<td>0.43</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>($F = 17.08, p &lt; .001$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.78</td>
<td>0.61</td>
</tr>
<tr>
<td>Distress</td>
<td>2.</td>
<td>Negative Life Events</td>
<td>0.81</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>($F = 142.39, p &lt; .001$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Illness</td>
<td>1.</td>
<td>Hardiness</td>
<td>0.29</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>($F = 13.26, p &lt; .001$)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Multiple R includes all variables in the equation at a particular step.

<sup>b</sup>$R^2$ is the variance accounted for by all variables in the equation at a particular step.
Table 5

Stepwise Multiple Regression Analyses with Hassles, Negative Life Events, and Hardiness and Interaction as Predictors (Males)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Step</th>
<th>Predictor</th>
<th>Multiple R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;b&lt;/sup&gt;&lt;sub&gt;2&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.43</td>
<td>0.18</td>
</tr>
<tr>
<td>Symptoms</td>
<td>2.</td>
<td>Hardiness</td>
<td>0.52</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Hardiness X Hassles</td>
<td>0.61</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 13.90, p &lt; .001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.84</td>
<td>0.70</td>
</tr>
<tr>
<td>Distress</td>
<td>2.</td>
<td>Negative Life Events</td>
<td>0.87</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Hardiness X Hassles</td>
<td>0.95</td>
<td>0.91</td>
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<tr>
<td></td>
<td></td>
<td>(F = 234.22, p &lt; .001)</td>
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</tr>
<tr>
<td>Physical Illness</td>
<td>1.</td>
<td>Hardiness</td>
<td>0.24</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 4.34, p &lt; .05)</td>
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<td></td>
</tr>
</tbody>
</table>

Note. Hassles X Hardiness, Hassles X Negative Life Events, and Negative Life Events X Hardiness were included as interaction terms.

<sup>a</sup>Multiple R includes all variables in the equation at a particular step.

<sup>b</sup>R<sup>2</sup> is the variance accounted for by all variables in the equation at a particular step.
Table 6
Stepwise Multiple Regression Analyses with Hassles, Negative Life Events, and Hardiness and Interaction Terms as Predictors (Females)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Step</th>
<th>Predictor</th>
<th>Multiple R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.44</td>
<td>0.19</td>
</tr>
<tr>
<td>Symptoms</td>
<td>2.</td>
<td>Negative Life Events</td>
<td>0.50</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 11.89, p &lt; .001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.47</td>
<td>0.23</td>
</tr>
<tr>
<td>Distress</td>
<td>2.</td>
<td>Hardiness</td>
<td>0.54</td>
<td>0.29</td>
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<tr>
<td></td>
<td></td>
<td>(F = 14.83, p &lt; .001)</td>
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</tr>
<tr>
<td>Physical Illness</td>
<td>1.</td>
<td>Hassles</td>
<td>0.39</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Hardiness</td>
<td>0.47</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Negative Life Events X Hassles</td>
<td>0.53</td>
<td>0.28</td>
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<tr>
<td></td>
<td></td>
<td>(F = 9.35, p &lt; .001)</td>
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</tr>
</tbody>
</table>

Note. Hassles X Hardiness, Hassles X Negative Life Events, and Negative Life Events X Hardiness were included as interaction terms.

<sup>a</sup>Multiple R includes all variables in the equation at a particular step.

<sup>b</sup>R<sup>2</sup> is the variance accounted for by all variables in the equation at a particular step.
Table 7

Stepwise Multiple Regression Analyses with Hassles, Negative Life Events, Control, Commitment, and Challenge as Predictors (Males)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Step</th>
<th>Predictor</th>
<th>Multiple R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Symptoms</td>
<td>1</td>
<td>Hassles</td>
<td>0.43</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Control</td>
<td>0.49</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 11.51, p &lt; .001)</td>
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<td></td>
</tr>
<tr>
<td>Psychological Distress</td>
<td>1</td>
<td>Hassles</td>
<td>0.84</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Negative Life Events</td>
<td>0.88</td>
<td>0.77</td>
</tr>
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<td></td>
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<td>(F = 115.84, p &lt; .001)</td>
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<td>Physical Illness</td>
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<td>(No significant predictors)</td>
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<sup>a</sup>Multiple R includes all variables in the equation at a particular step.

<sup>b</sup>R<sup>2</sup> is the variance accounted for by all variables in the equation at a particular step.
Table 8

Stepwise Multiple Regression Analyses with Hassles, Negative Life Events, Control, Commitment, and Challenge as Predictors (Females)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Step</th>
<th>Predictor</th>
<th>Multiple R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2b&lt;/sup&gt;</th>
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<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.44</td>
<td>0.19</td>
</tr>
<tr>
<td>Symptoms</td>
<td>2.</td>
<td>Control</td>
<td>0.52</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Negative Life Events</td>
<td>0.56</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 11.23, p &lt; .001)</td>
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<td></td>
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<tr>
<td>Psychological</td>
<td>1.</td>
<td>Hassles</td>
<td>0.47</td>
<td>0.23</td>
</tr>
<tr>
<td>Distress</td>
<td>2.</td>
<td>Commitment</td>
<td>0.57</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(F = 17.25, p &lt; .001)</td>
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</tr>
<tr>
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<td>1.</td>
<td>Commitment</td>
<td>0.41</td>
<td>0.17</td>
</tr>
<tr>
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<td>2.</td>
<td>Hassles</td>
<td>0.50</td>
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<td></td>
<td>(F = 12.02, p &lt; .001)</td>
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</tr>
</tbody>
</table>

<sup>a</sup>Multiple R includes all variables in the equation at a particular step.

<sup>b</sup>R<sup>2</sup> is the variance accounted for by all variables in the equation at a particular step.
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Lefcourt, H. M., Miller, R. S., Ware, E. E., & Sherk, D. (1981). Locus of control as a modifier of the


