The Relationship of Hardiness, Gender, and Stress to Health Outcomes in Adolescents

James A. Shepperd
College of the Holy Cross
Javad H. Kashani
Department of Psychiatry
University of Missouri

ABSTRACT The present study examined the relationship between the hardiness components of commitment, control, and challenge, and the experience of physical and psychological symptoms in a sample of 150 (75 male, 75 female) adolescents. A measure of psychosocial stress was included to permit an examination of whether the hardiness components interact with stress in predicting health outcomes. Analyses revealed main effects of stress, gender, and the hardiness components of commitment and control for several of the health measures. More important was the finding of a consistent interaction of stress, gender, and hardiness for several of the health measures. Whereas low-stress males experienced few physical and psychological symptoms regardless of their levels of commitment and control, high-stress males experienced more problems when they were low rather than high in either commitment or control. The hardiness components did not interact with stress in the prediction of health outcomes among females.

In the late 1970s Kobasa (1979) introduced the concept of psychological hardiness and suggested that hardiness moderates the relationship between stressful life events and illness. Kobasa characterized hardiness

We wish to express our gratitude to all of the families who participated in this study and to Colleen Corcoran, Carolyn Fallahi, and Jeanne McAllister, who assisted in the data collection. In addition, we wish to thank Royce Singleton, Paul Blaney, and two anonymous reviewers for helpful comments on an earlier draft of this article. Address correspondence to James A. Shepperd, Department of Psychology, College of the Holy Cross, Worcester, MA 01610.

Journal of Personality 59:4, December 1991. CCC 0022-3506/91/$1.50

as being comprised of three components: (*a*) a *commitment* to oneself and work, (*b*) a sense of personal *control* over one's experiences and outcomes, and (*c*) the perception that change represents *challenge*, and thus should be treated as an opportunity for growth rather than as a threat.

Individuals high in hardiness are hypothesized to be better able to withstand the negative effects of life stressors and, consequently, are less likely than individuals low in hardiness to become ill. Their resistance to illness presumably results from perceiving life changes as less stressful (Kobasa, 1979) or from having more resources at their disposal to cope with life changes (Kobasa, 1982). In support of this hypothesis Kobasa found that hardy executives were more likely to remain healthy under conditions of high stress than were nonhardy executives (Kobasa, Maddi, & Kahn, 1982).

Since the initial research by Kobasa and her colleagues, other investigators have examined the relationship between hardiness and psychological health, most often focusing on hardiness as a predictor of depression (e.g., Funk & Houston, 1987; Ganellen & Blaney, 1984; Rhodewalt & Zone, 1989; see also Benassi, Sweeney, & Dufour, 1988). The consistent finding is that low hardiness is associated either directly or indirectly with greater depression.

However, depression is only one indicator of psychological health, and certainly is not the only one associated, at least in some circumstances, with life change and stress. There is substantial evidence that a variety of other psychological problems are triggered, exacerbated, or made manifest by stressful events (e.g., Cooper, 1983; B. S. Dohrenwend & B. P. Dohrenwend, 1981; Holmes & Masuda, 1974; Parkes, 1975; Parkes & Weiss, 1983). For example, Maguire and his colleagues (Maguire et al., 1978) found persistent, severe levels of anxiety in 39% of a sample of women treated for breast cancer in the preceding year. Presumably, the anxiety was an outgrowth of the treatment and physical changes associated with the cancer. Other researchers have found evidence for a posttraumatic stress disorder in which exposure to severe trauma (e.g., the violent death of a loved one) can trigger intense feelings of anxiety (Davison & Neale, 1986; Green, Lindy, & Grace, 1985). Finally, there is growing evidence for a diathesis-stress model of schizophrenia, in which stressful events can trigger episodes of schizophrenia in individuals with a genetic predisposition for the illness (see Mirsky & Duncan, 1986, for a review).

Importantly, some individuals undergoing life change or facing trau-

matic events exhibit no psychological disturbances. They appear well adjusted despite enduring tremendous stress or immense hardship. Perhaps, in addition to moderating the experience of physical health and depression, psychological hardiness also moderates the experience of other psychological disturbances. To our knowledge, only two studies have examined the relationship between hardiness and psychological disturbances other than depression. Both found a direct relationship between hardiness measured globally and psychological distress (Nowack, 1986; Rhodewalt & Agustsdottir, 1984). Yet the measure of global hardiness has been criticized on psychometric grounds. Specifically, several researchers have demonstrated that the three components of hardiness predict health outcomes independently, thus suggesting that hardiness is a multidimensional rather than a unitary phenomenon (Ganellen & Blaney, 1984; Hull, Van Treuren, & Virnelli, 1987; Larson, Schellenberg, & Markley, 1987; Rich & Rich, 1985; Schlosser & Sheeley, 1985; Van Treuren & Hull, 1987). In addition, Hull et al. (1987) have demonstrated that only the hardiness components of commitment and control have acceptable psychometric qualities and predict health outcomes consistently.

The present study examined the relationship between psychological hardiness and the experience of a variety of dysfunctional symptoms in a sample of male and female adolescents, focusing primarily on the hardiness components of commitment and control as predictors rather than on global hardiness. Adolescents were targeted for investigation in the present study to examine the generality of the hardiness construct to a nonadult population. In light of our sample, we examined symptoms of four psychological disturbances found among adolescents: anxiety, psychosis, delusions, and eating disorders (Gammon et al., 1983; Rice, 1990). Given that these disturbances can be viewed as being linked to problems of alienation and control (American Psychiatric Association, 1987; Mizes, 1988), we predicted that individuals high in commitment and control would report fewer symptoms of psychological disturbances (as well as fewer somatic problems) than would individuals low in commitment and control. In addition, in line with previous research, we predicted that commitment and control would interact with stress in the prediction of health outcomes. Specifically, no differences in somatic symptoms or psychological disturbances were expected among low-stress individuals regardless of their level of commitment or control. By contrast, among high-stress individuals, those high in commitment and control were predicted to experience fewer somatic symptoms and

fewer symptoms of psychological disturbances than were individuals low in commitment and control.

Exploring Gender Differences in Hardiness

Researchers have revealed gender differences in the incidence of various psychiatric problems, with men being more vulnerable to some disturbances and women being more vulnerable to others (Al-Issa, 1982; B. P. Dohrenwend & B. S. Dohrenwend, 1976; Kessler & McRae, 1981). These findings suggest that gender is an important predictor of psychological disturbances. Nevertheless, most investigations of hardiness have focused on only one gender. The few studies that have examined both males and females have produced equivocal results. For example, Rhodewalt and Agustsdottir (1984) found no gender difference in the relationship between hardiness (albeit, global hardiness) and psychological distress. Others have found that control moderates the stress/illness relationship among men but not among women (Caldwell, Pearson, & Chin, 1987). This latter finding suggests that hardiness (or at least the control component) may be a better predictor of the stress/illness relationship for men than for women, a point echoed by other researchers (Schmied & Lawler, 1986). The above research notwithstanding, some investigators have found that hardiness *does* predict health outcomes among women (Ganellen & Blaney, 1984; Rhodewalt & Zone, 1989). There is no apparent explanation for the inconsistent findings across studies. Obviously, additional research is needed before conclusions regarding gender differences in the effects of hardiness can be reached. The present study sought to examine further the relevance of gender in studying hardiness by including both males and females in the sample. In light of the equivocal findings regarding the relationship between gender, hardiness, and health outcomes, no predictions were made with respect to sex differences in the effect of the hardiness components.

METHOD

Subjects

Subjects were 150 adolescents (75 males, 75 females) randomly selected from an initial pool of approximately 1,700 adolescents attending public schools in Columbia, Missouri, and ranging in age from 14 to 16 years. Parents of the adolescents provided written consent and were provided $20 for their child's

participation. Subjects were administered the Diagnostic Interview for Children and Adolescents (DICA; B. Herjanic, M. Herjanic, Brown, & Wheatt, 1975), the Hardiness Scale (Kobasa & Maddi, 1982), and a variety of other instruments irrelevant to the purposes of the present study. Both the participants and the research assistants involved in this study were blind to the hypotheses of the investigation.

Materials

Measuring hardiness. Hardiness was measured using the short form of the Hardiness Scale recommended by Hull et al. (1987). In light of evidence suggesting that hardiness is a multidimensional phenomenon, the components of hardiness rather than global hardiness were assessed. Similar to procedures used by Hull et al. (1987), in scoring the hardiness measure of control, items originating from the External Locus of Control Scale were assigned values of 0 or 4. This was done to insure that the weighting of these items was equivalent to the weighting of the items originating from the Powerlessness Scale, which could take on values *ranging* from 0 to 4.

All three components have test-retest reliability correlations falling within an acceptable range (rs = .79, .78, and .64 for commitment, control, and challenge, respectively). Nevertheless, Hull et al. (1987) have argued that, of the three components, only commitment and control have acceptable internal consistency (Cronbach's α for the short form $>$ .70) and predict health outcomes consistently. Consequently, the present study focused primarily on the hardiness subscales of commitment and control. However, for exploratory purposes, the challenge component was also examined.

Assessing dysfunctional symptoms. The presence of dysfunctional symptoms was assessed using the DICA (B. Herjanic et al., 1975; B. Herjanic & Reich, 1982), a structured interview based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM III-R) (American Psychiatric Association, 1987) and designed to provide an objective assessment of the presence or absence of a number of clinical diagnoses in children. Respondents answer "yes" (have the symptom) or "no" (do not have the symptom) to a long list of dysfunctional symptoms representing several different clinical diagnoses. Affirmative responses to a predetermined type and number of dysfunctional symptoms within a given diagnostic category suggest evidence for that diagnosis. Previous research suggests that the DICA reliably distinguishes disturbed children from normal children (Sylvester, Hyde, & Reichler, 1987) and that diagnoses made based on the DICA are consistent with diagnoses made by clinicians (Welner, Reich, B. Herjanic, & Jung, 1987).

Although only a few subjects in our sample reported enough symptoms to warrant a clinical diagnosis, subjects nevertheless varied considerably in the

number of dysfunctional symptoms they reported. Consequently, our analyses focused on the number of symptoms reported rather than on the presence or absence of a DSM III-R diagnosis.

The present study focused on the four specific symptom groups within the DICA. These were anxiety symptoms, eating disorder symptoms, psychotic symptoms, and delusional symptoms. The list of anxiety symptoms was composed of 32 items assessing simple phobia (10 items), overanxious disorders (12 items), and obsessive-compulsive disorders (10 items). Example items are "Are you afraid of standing up and speaking in front of the class?" and "Do you worry a lot about doing things just right or perfectly?" The mean number of anxiety symptoms reported was 3.98 ($SD = 4.34$), with a range of 0 to 20.

The list of eating disorder symptoms was composed of 12 items characteristic of anorexia nervosa (5 items) and bulimia (7 items). Example items are "Have you ever tried to keep your weight below what your parents or doctor said it should be?" and "Did you ever go on eating binges when you ate much larger amounts of food than usual all at one time?" The mean number of eating disorder symptoms reported was 1.39 ($SD = 1.68$), with a range of 0 to 7.

The list of psychotic symptoms was composed of 13 items characteristic of psychosis. An example item is "Have you ever had the experience of hearing things other people couldn't hear?" The mean number of psychotic symptoms reported was .83 ($SD = 1.62$), with a range of 0 to 9.

The list of delusional symptoms was composed of 16 items representing various forms of delusions. An example item is "Have you ever thought that anyone is plotting against you to try to poison you, or to get rid of you?" The mean number of delusional symptoms reported was 1.01 ($SD = 1.68$), with a range of 0 to 9.

Assessing somatic problems. Thirty-four items from the DICA assess a variety of physical complaints and problems. Again, subjects respond "yes" (have experienced the problem) or "no" (have not experienced the problem) to each item. A total somatic problems score is computed for each subject by summing the number of "yes" responses given across the 34 items. Example items are "Do you have headaches?" and "Have you ever had trouble catching your breath when you were just sitting or standing still?" The mean number of somatic problems reported was 6.14 ($SD = 4.17$), with a range of 0 to 17.

Measuring stress level. A final section of the DICA assesses psychosocial stress by summing the number of "yes" responses (have experienced the stressor) provided by the adolescent on 14 items. Example items include "Is someone in the family seriously ill, handicapped, or crippled so that you worry about it?" and "Does someone from your home have problems with the police?" The mean number of psychosocial stressors reported by subjects was 2.75 ($SD = 1.89$), with a range of 0 to 10. Cronbach's α for this ad hoc measure of stress was .60.

RESULTS

Because the sample in the present study was composed of adolescents, descriptive statistics were generated for the three dimensions of hardiness to provide normative information for comparison with other samples. The mean commitment score was 17.78 (SD = 5.70, range = 12 to 42), the mean control score was 33.36 (SD = 7.13, range = 16 to 52), and the mean challenge score was 20.07 (SD = 3.44, range = 9 to 28). Cronbach's α for the three subscales was .86 for commitment, .49 for challenge, and .55 for control. With the exception of control (Cronbach's α was lower than expected), the internal consistency of the items from the hardiness subscales was consistent with previous research (Hull et al., 1987). The pattern of correlations between the hardiness components is similar to that reported by Hull et al. (1987), with a small positive correlation found between commitment and control (.34), and a negligible correlation found between commitment and challenge (−.09) and control and challenge (−.11). None of the hardiness components correlated with stress (all rs $< .03$). However, a small yet significant correlation emerged between gender and commitment ($r = -.29, p < .001$), with males scoring lower in commitment than females, and between gender and stress ($r = .30, p < .001$), with males reporting fewer psychosocial stressors than females.

The intercorrelations of the five dependent measures are presented in Table 1. Cronbach's α for the items of each measure are presented on the diagonal. As might be expected given that most of the measures are composed of items tapping psychiatric symptoms, the intercorrelations are moderate. The highest correlation is between the measures tapping symptoms of psychosis and symptoms of delusions. This is not surprising given that both measures are tapping dimensions of schizophrenia. However, in no case does a correlation between two measures exceed the internal consistency of either measure. Consequently, each of the measures was examined separately.

The remaining analyses were conducted using hierarchical multiple regression (Pedhazur, 1982). Separate regression analyses were conducted for each of the hardiness components, with the first set of analyses focusing exclusively on control, the second on commitment, and the third on challenge. Following Pedhazur (1982; see also Funk & Houston, 1987; Rhodewalt & Zone, 1989), seven predictors were included in each analysis, with first-order terms entered into the regression model prior to the interactions, and the first-order interactions entered prior to the single second-order interaction. Thus, for example, in the analy-

Table 1
Intercorrelations of the Symptom Reports

	Somatic problems	Anxiety symptoms	Eating disorder symptoms	Psychotic symptoms	Delusional symptoms
Somatic problems	.77	.36	.39	.49	.46
Anxiety symptoms		.87	.46	.33	.45
Eating disorder symptoms			.68	.23	.34
Psychotic symptoms				.78	.56
Delusional symptoms					.74

ses involving control, the seven predictors were, in order of entry, Sex, Control, Stress, Sex × Control, Sex × Stress, Stress × Control, and Sex × Control × Stress.

Hardiness and the Experience of Somatic Problems

Analyses of the number of somatic problems reported revealed a significant main effect of gender (consistent and significant across the three separate sets of analyses), $F(1, 142) = 4.18$, $p < .05$. Females reported a greater number of somatic problems ($M = 6.72$) than did males ($M = 5.56$). Analyses also revealed a significant effect of stress level (also consistent and significant across the three sets of analyses), $F(1, 142) = 12.08, p < .001, B = .576$. As is indicated by the positive regression coefficient, high stress was associated with more somatic problems than low stress.

Significant main effects also emerged for control, $F(1, 142) = 8.96$, $p < .005$, $B = .121$, and commitment, $F(1, 142) = 13.21$, $p < .001$, $B = .188$,[1] with adolescents low in control and commitment reporting more somatic problems than adolescents high in control and commitment.

1. Importantly, all three components of hardiness function as *negative* indicators of the construct. Thus, individuals receiving a high score on one of the components (i.e., endorse most of the items on the subscale measuring that component) are actually low on that component. As a result, a negative regression coefficient means that individuals high in control and high in commitment reported a larger number of somatic problems.

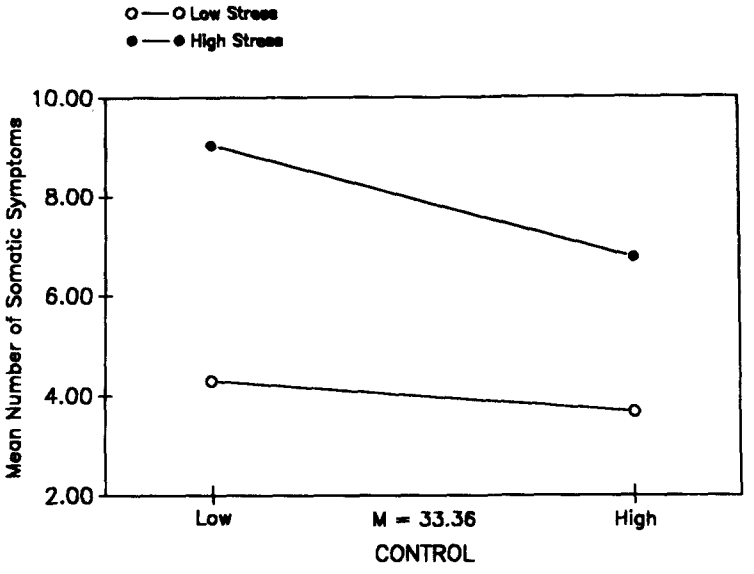

Figure 1
Somatic Symptoms Experienced as a Function of Stress Level and Control

Note. Regression lines calculated for mean ± 1 *SD* on the hardiness measure of control.

The main effect of control was qualified by a significant interaction of control and stress level, $F(1, 142) = 6.30$, $p < .02$. To identify the nature of this interaction, subjects were classified into high- and low-stress groups based on a median split of the number of psychosocial stressors they reported. Next, control was entered into two separate regression analyses predicting the experience of somatic problems (one for high-stress subjects and one for low-stress subjects), and the resulting regression coefficients were tested to determine whether they differed significantly from zero. These tests revealed that only one of the two regression coefficients (control as a predictor of somatic problems in the high-stress group) was significant ($p < .02$, $B = .165$).

For illustration purposes, the regression lines associated with the high- and low-stress groups are plotted in Figure 1. A clear presentation of an interaction involving continuous variables requires that regression coefficients be computed for discrete points. Typically, this is done by selecting points equal distance above and below the mean (see J. Cohen

& P. Cohen, 1975). Figure 1 reveals that, among subjects reporting a large number of psychosocial stressors, high control is associated with fewer somatic problems, whereas low control is associated with more somatic problems. Among adolescents reporting a small number of psychosocial stressors, level of control is unrelated to the number of somatic problems reported. Thus, low control appears to be associated with the experience of greater somatic problems, but only among high-stress adolescents.

The main effect of commitment was qualified by a significant three-way interaction of commitment, stress, and gender, $F(1, 142) = 5.68$, $p < .02$. To identify the nature of this interaction, subjects again were classified into high- and low-stress groups. However, four rather than two separate regression analyses were performed: one each for high-stress males, low-stress males, high-stress females, and low-stress females. Tests of the resulting regression coefficients revealed that two were significant: commitment as a predictor of somatic problems among high-stress males ($p < .01$, $B = .347$) and low-stress females ($p < .05$, $B = .316$).

As evident in Figure 2, among high-stress males, high commitment was associated with fewer somatic problems, whereas low commitment was associated with more somatic problems. Among low-stress males, commitment was unrelated to the number of somatic problems experienced. For females the pattern was different. Specifically, high commitment was associated with the experience of fewer somatic problems, but under conditions of low stress rather than high stress. Under conditions of high stress, commitment was not associated with the experience of somatic problems.

In sum, commitment appears to play a different role in the stress/illness relationship for males and females. For males, high commitment was associated with fewer somatic problems under conditions of high stress. For females, high commitment was associated with fewer somatic problems under conditions of low stress.

The exploratory analysis using challenge as a predictor of somatic problems revealed one significant effect: a significant three-way interaction of challenge, stress, and gender, $F(1, 142) = 12.08$, $p < .001$. Tests of the four regression coefficients generated using the procedure described above revealed that only the coefficient for low-stress males was significant ($p < .02$, $B = -.363$). The sign of this regression coefficient reveals that among low-stress males, high challenge was

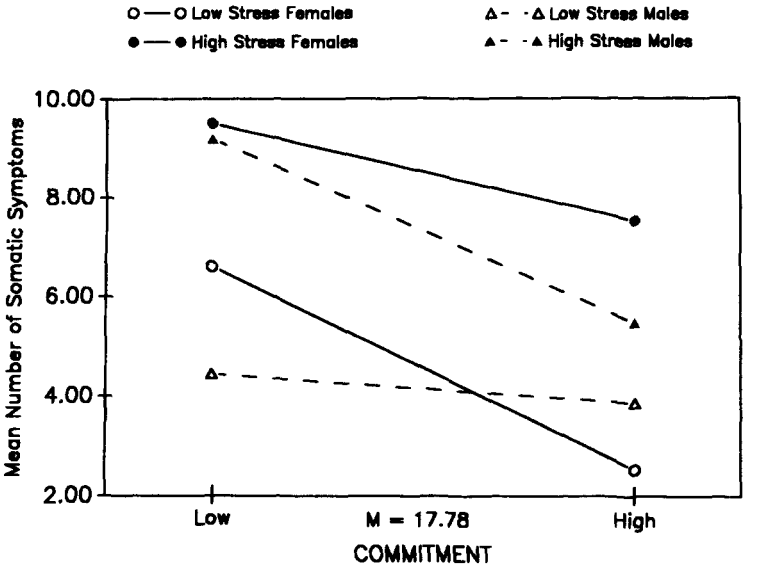

Figure 2
Somatic Symptoms Experienced as a Function of Gender, Stress Level, and Commitment

Note. Regression lines calculated for mean ±1 *SD* on the hardiness measure of commitment.

associated with the experience of *more* somatic problems. This curious finding is discussed later.

Hardiness and the Experience of Dysfunctional Symptoms

The regression procedures above were repeated to determine whether hardiness is associated with the experience of dysfunctional symptoms. To simplify the presentation of the results, the analyses associated with each of the three hardiness components are discussed separately.

Analyses using control as a predictor. The analyses of the four groups of dysfunctional symptoms revealed a significant main effect of gender for three of the four symptom groups. As shown in Table 2, females reported more anxiety, eating disorder, and delusional symptoms than did males. Analyses also revealed a significant effect of stress for all

Table 2
Mean Number of Dysfunctional Symptoms for Male and Female Adolescents

Symptom group	Males	Females	F	p
Anxiety	3.04	4.92	8.33	.005
Eating disorder	.89	1.89	15.78	.001
Psychosis	.99	.68	1.72	*ns*
Delusional	.64	1.39	9.01	.005

Note. Higher numbers reflect more dysfunctional symptoms.

Table 3
Stress Level as a Predictor of Dysfunctional Symptoms

Symptom group	B	F	p
Anxiety	.576	9.02	.004
Eating disorder	.232	11.49	.001
Psychosis	.305	18.02	.001
Delusional	.354	21.56	.001

Note. B represents the standardized regression coefficients. A positive value for B reflects a positive relationship between stress level and the dysfunctional symptom.

four measures of dysfunctional symptoms. As indicated by the signs of the regression coefficients reported in Table 3, high-stress respondents experienced more anxiety, eating disorder, psychotic, and delusional symptoms than did low-stress respondents.[2]

Finally, analyses revealed a significant effect of control for anxiety symptoms, $F(1, 142) = 4.64, p < .03, B = .100$, and psychotic symptoms, $F(1, 142) = 9.49, p < .003, B = .051$. The positive values for the regression coefficients indicate that adolescents low in control reported more anxiety and psychotic symptoms than did adolescents high in control.

The control effects for psychotic symptoms were qualified by a significant interaction of control and stress level, $F(1, 142) = 10.00$, $p < .002$, and a marginally significant interaction of control and gen-

2. Naturally, the significant effects for gender and stress emerging in the analyses using the hardiness measure of control remained significant when the hardiness measures of commitment and challenge were substituted for the measure of control. To avoid redundancy, these effects are not repeated.

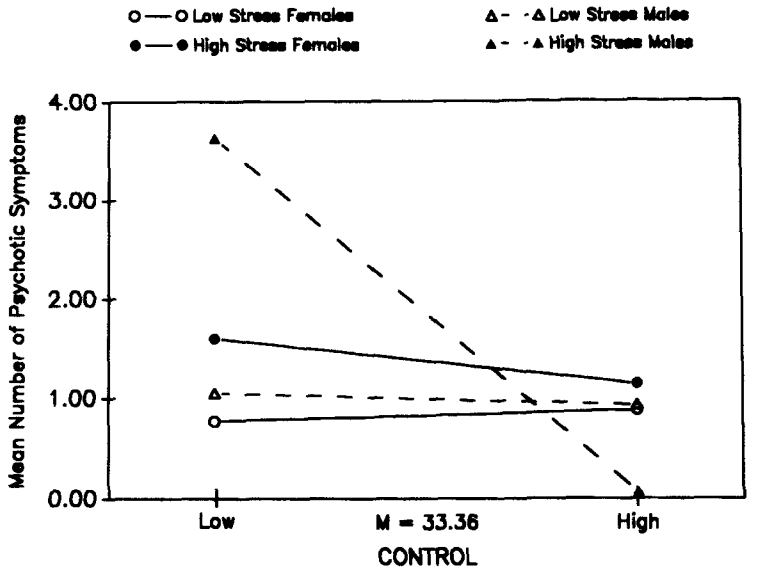

Figure 3
Psychotic Symptoms Experienced as a Function of Gender, Stress Level, and Control

Note. Regression lines calculated for mean ±1 *SD* on the hardiness measure of control. This same pattern appeared when control was used to predict anxiety and eating disorder symptoms and when commitment was used to predict psychotic symptoms.

der, $F(1, 142) = 3.70$, $p < .06$. However, these two two-way interactions were themselves qualified by a significant three-way interaction of control, stress, and gender, $F(1, 142) = 4.39$, $p < .04$.

Using the procedures described above, the nature of this interaction was examined by performing four separate regression analyses and testing whether the resulting regression coefficients differed significantly from zero. Only the regression coefficient for high-stress males was significant ($p < .001$, $B = .247$). The plot of the regression lines in Figure 3 reveals that, among high-stress males, high control was associated with the experience of fewer psychotic symptoms, whereas low control was associated with the experience of more psychotic symptoms. Among low-stress males and among both high- and low-stress females, control was unrelated to the experience of psychotic symptoms.

A significant three-way interaction of control, stress, and gender also emerged for the measure of anxiety symptoms, $F(1, 142) = 6.99$,

$p < .01$, and for the measure of eating disorder symptoms, $F(1, 142) = 3.53$, $p < .06$. An examination of the four regression lines generated for each symptom group using the procedures described above revealed a pattern virtually identical to that found for psychotic symptoms and plotted in Figure 3. Similar to the findings for psychotic symptoms, control mitigated the impact of stress on anxiety and eating disorder symptoms among high- but not low-stress males. Also similar to the findings for psychotic symptoms, control was unrelated to the experience of anxiety or eating disorder symptoms among females, regardless of stress level.

Analyses using commitment as a predictor. When the analyses described above were repeated using commitment rather than control to predict dysfunctional symptoms, a significant main effect of commitment emerged for the report of anxiety symptoms, $F(1, 142) = 4.68$, $p < .05$, $B = .132$, and the report of psychotic symptoms, $F(1, 142) = 8.40$, $p < .01$, $B = .063$. Similar to control, the positive regression coefficients indicate that adolescents low in commitment experienced a greater number of psychotic and anxiety symptoms than did adolescents high in commitment.

The main effect of commitment for psychotic symptoms was qualified by a significant two-way interaction of commitment and gender, $F(1, 142) = 4.86$, $p < .05$. However, this interaction was itself qualified by a significant three-way interaction of commitment, stress, and gender, $F(1, 142) = 6.88$, $p < .01$. Examination of the four regression lines generated from the regression equations revealed a pattern similar to that emerging when control was used to predict psychotic, anxiety, and eating disorder symptoms (see Figure 3). Specifically, although commitment was unrelated to the experience of psychotic symptoms among females regardless of stress level, commitment was associated with the experience of more psychotic symptoms among high- but not low-stress males.

A significant three-way interaction of commitment, stress, and gender also emerged for the measure of delusional symptoms, $F(1, 142) = 4.37$, $p < .05$. However, none of the four regression coefficients derived to examine the interaction differed significantly from zero. Consequently, this interaction will not be discussed.

Analyses using challenge as a predictor. When the analyses reported above were repeated using challenge to predict dysfunctional symp-

toms, only one significant effect emerged, a significant three-way interaction of challenge, stress, and gender for the measure of psychotic symptoms, $F(1, 142) = 4.05$, $p < .05$. However, similar to the three-way interaction of commitment, gender, and stress for delusional symptoms, none of the individual regression coefficients derived to examine the interaction differed significantly from zero.

Testing the Predictive Purity of Control and Commitment

Given the modest correlation between control and commitment and the finding that these two hardiness components often predicted similarly, the analyses involving control were repeated with commitment included as a covariate. Likewise, the analyses involving commitment were repeated with control included as a covariate. With one exception, the inclusion of the covariate had no appreciable effect on the predictive capacity of any of the effects described above. The exception emerged in the analyses involving the report of anxiety symptoms. When commitment was included as a covariate, control no longer predicted significantly ($p > .15$). Likewise, when control was included as a covariate, commitment no longer predicted significantly ($p > .20$). Importantly, the interaction of control, stress, and gender for anxiety symptoms remained significant even with commitment included as a covariate. When viewed collectively, these findings suggest that commitment and control can be regarded as statistically distinct in their predictive ability.

DISCUSSION

The present study reexamines the relationship between the hardiness components and health. This study differs from most previous investigations in three important ways: First, in addition to examining physical health, the present study investigates the relationship between the hardiness components and the experience of psychological disturbances other than depression. Second, given the precedence for gender differences in various psychological disturbances, gender was included as a variable to explore possible gender differences in the influence of the hardiness components. Third, the present study examines hardiness in a community sample of adolescents, thereby permitting a test of the generality of the hardiness construct to a nonadult population.

Hardiness and Physical Health

The present study revealed that commitment and control significantly predicted physical health. Adolescents high in either commitment or control experienced fewer somatic problems than did adolescents low in commitment or control. In addition, the relationship between control and physical health depended upon the adolescent's stress level. Among adolescents experiencing a large number of stressors, high control was associated with the report of fewer somatic problems. Among adolescents experiencing only a few stressors, high control was associated with fewer somatic problems. This Stress × Control interaction in predicting physical health is consistent with findings from the larger locus of control literature (e.g., Brand, J. H. Johnson, & S. B. Johnson, 1986; Kubitz, Peavey, & Moore, 1986).

A similar finding emerged for the hardiness component commitment, but only among males. Among females, high commitment was associated with fewer somatic problems under conditions of *low* stress. In light of the gender effects for somatic problems, this finding suggests that experiencing a relatively large number of somatic problems may be normative for female adolescents in our sample. Only a small group of females, those who reported few stressors and were high in commitment, deviate from this norm by experiencing relatively few somatic problems. For male adolescents in our sample the norm appears to be the experience of relatively few somatic problems, with one notable exception—males who report a larger number of psychosocial stressors and are low in commitment.

The exploratory analyses using challenge to predict somatic problems yielded a peculiar finding. Whereas challenge was unrelated to the experience of somatic problems among females, for low-stress males high challenge ironically was associated with an *increase* in the experience of somatic problems. This puzzling finding assumes greater significance in light of other evidence demonstrating that challenge is associated with health outcomes in a manner opposite of prediction (Hull, Van Treuren, & Propsom, 1988; Kobasa, 1980, cited in Hull et al., 1987). When viewed cumulatively these findings suggest that challenge at best is unrelated to health outcomes, and at worst, predicts health outcomes in a manner opposite to theoretical expectations.

An important caveat in the present study and the hardiness research in general should be noted. Most investigations of hardiness, including our own, have relied on self-report instruments to assess health status rather than using physiological measures or medical records. There is

some evidence that self-report measures of illness reflect negative affectivity and are unrelated to actual, long-term health status (Watson & Pennebaker, 1989). This evidence calls much of the hardiness literature into question. Hardiness and its components may be related to reports of somatic symptoms but not to actual physical health (Allred & Smith, 1989). Fortunately, there is evidence suggesting that hardiness *is* related to objective measures of health (Brand et al., 1986; Kubitz et al., 1986; Okun, Zautra, & Robinson, 1988). For example, Okun et al. (1988) found the hardiness component of control correlated with self-reported health and with a physiological measure of immune system functioning (i.e., the percentage of T-cells in the blood). To the extent that the findings of these and other researchers reveal that self-report and objective measures of health are equivalent, then the present findings contribute to the mounting evidence that the hardiness components of commitment and control predict actual health outcomes. Nevertheless, additional research using objective measures of health status is needed.

Hardiness and Psychological Health

In the present study the commitment and control components of hardiness interacted with stress in the prediction of psychological health. Adolescents high in either commitment or control experienced fewer anxiety symptoms and fewer psychotic symptoms than did adolescents low in commitment or control. In addition, a consistent three-way interaction of control, stress, and gender emerged for three of the four groups of dysfunctional symptoms. In each case, control was unrelated to the experience of dysfunctional symptoms among females regardless of stress level. By contrast, control significantly predicted the experience of dysfunctional symptoms among high- but not low-stress males. For high-stress males, greater control was associated with fewer psychotic, anxiety, and eating disorder symptoms, whereas less control was associated with more of these symptoms, a finding that is consistent with previous research (Hunter & Locke, 1984).[3]

Commitment also interacted with gender and stress in predicting psychotic symptoms. Similar to control, this interaction was due primarily

3. A recent meta-analysis found that gender did not reliably moderate the relationship between locus of control and depression (Benassi et al., 1988). Importantly, this meta-analysis did not examine the role of gender in the Control × Stress interaction. In addition, the meta-analysis focused on depression, whereas our study examined symptoms of psychological disturbances other than depression.

to differences among high-stress males. Among these males, low commitment was associated with the experience of more psychotic symptoms, whereas high commitment was associated with the experience of fewer psychotic symptoms.

The consistent finding in the present study that control and commitment predicted health outcomes for males but not for females is intriguing and merits further consideration. It is clear that the gender difference is not attributable to differences between males and females in the hardiness components. With the exception of a small correlation between gender and the hardiness component of commitment (females were *higher* in commitment), males were no more hardy than females. Nor does the gender difference appear attributable to differences in stress level. Although males and females reported different levels of stress, the difference was small and unlikely to account for the relationship between the hardiness components and health at the various levels of stress. In addition, the hardiness components were unrelated to the experience of dysfunctional symptoms among either high- or low-stress females.

Schmied and Lawler (1986) have suggested that hardiness may be related to health outcomes among males but not among females. However, a recent study by Rhodewalt and Zone (1989) found that hardiness predicted both physical and mental health among women. Given the apparent inconsistency between our study and the study by Rhodewalt and Zone, several important methodological distinctions should be noted. First, only females were included in the Rhodewalt and Zone study, making an examination of sex differences in the hardiness/health relationship impossible. Second, Rhodewalt and Zone examined global hardiness, whereas we examined the hardiness components. Given the low intercorrelations among the hardiness components and the finding that each of the hardiness components correlates only moderately with global hardiness (Hull et al., 1987), perhaps global hardiness and its components should not be expected to predict similarly. Finally, the inconsistent findings from the two studies may be attributable to different samples—adult working women in the Rhodewalt and Zone study, adolescent males and females in our own. Schmied and Lawler (1986) have noted that the level of hardiness in females differs with age. Perhaps the relationship of hardiness to illness in females also is a function of age, predicting among older but not younger females. More research is needed to address this possibility.

Recently it has been suggested that the hardiness measure actually

assesses maladjustment and not stress resilience (Allred & Smith, 1989; Funk & Houston, 1987; Rhodewalt & Zone, 1989). This interpretation of hardiness is particularly relevant to the present study where several of the dependent variables are measures of maladjustment. However, an important finding in the present study makes this interpretation seem unlikely. Specifically, although female adolescents generally reported greater dysfunctional symptoms than male adolescents, they did not differ from males in their levels of control and challenge, and in fact were higher than males in commitment. Thus, although the females in our sample were more maladjusted than the males, the absence of sex differences in the hardiness components suggests that the present findings are not attributable to the components of hardiness being measures of maladjustment.

One final concern in the present study should be addressed. A number of researchers have noted that measures of stress often are confounded with measures of health outcomes (Brown, 1974; B. P. Dohrenwend & Shrout, 1985; B. S. Dohrenwend, B. P. Dohrenwend, Dodson, & Shrout, 1984; Hudgens, 1974). That is, the apparent ability of stress instruments to predict symptom reports is attributable in part to an unintended overlap between the different instruments. Fortunately, this concern does not appear to be a serious problem in the present study. A careful examination of the 14 items in our stress measure reveals that none reflect symptoms of psychological or physical problems experienced by the individual. Indeed, 10 of the 14 items refer to events that occur to someone other than the adolescent respondent (e.g., "Has someone you cared a lot about died?"). It is noteworthy, however, that 7 of the 14 items from our measure of stress assess whether or not the adolescent worries about a family problem or event (e.g., "Does someone drink a lot and cause disturbances at home *which worry you*?"). One might argue that worrying can be viewed as a symptom of psychopathology. Yet, it also can be argued that what often makes events stressful is the worrying that accompanies them. Moreover, worrying typically is viewed as pathological only in extreme cases.

To summarize, the present study found that the hardiness components of commitment and control interact with stress and gender in predicting health outcomes. Specifically, commitment and control moderated the experience of physical and psychological symptoms, but only among high-stress males. Finally, the emergence of a consistent gender difference in the impact of the hardiness components demonstrates the utility of including gender as a variable in future investigations of hardiness.

REFERENCES

Allred, K. D., & Smith, T. W. (1989). The hardy personality: Cognitive and physiological responses to evaluative threat. *Journal of Personality and Social Psychology*, **56**, 257–266.

Al-Issa, I. (1982). Gender and adult psychopathology. In I. Al-Issa (Ed.), *Gender and psychopathology* (pp. 83–101). New York: Academic Press.

American Psychiatric Association. (1987). *Diagnostic and statistic manual of mental disorders* (3rd ed. rev.). Washington, DC: Author.

Benassi, V. A., Sweeney, P. D., & Dufour, C. L. (1988). Is there a relation between locus of control orientation and depression? *Journal of Abnormal Psychology*, **97**, 357–367.

Brand, A. H., Johnson, J. H., & Johnson, S. B. (1986). Life stress and diabetic control in children and adolescents with insulin-dependent diabetes. *Journal of Pediatric Psychology*, **11**, 481–495.

Brown, G. W. (1974). Meaning, measurement, and stressful life events. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), *Stressful life events: Their nature and effects* (pp. 217–243). New York: Wiley.

Caldwell, R. A., Pearson, J. L., & Chin, R. J. (1987). Stress-moderating effects: Social support in the context of gender and locus of control. *Personality and Social Psychology Bulletin*, **13**, 5–17.

Cohen, J., & Cohen, P. (1975). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Cooper, C. L. (1983). *Stress research: Issues for the eighties*. Chichester, England: Wiley.

Davison, G. C., & Neale, J. M. (1986). *Abnormal psychology: An experimental clinical approach* (4th ed.). New York: Wiley.

Dohrenwend, B. P., & Dohrenwend, B. S. (1976). Sex differences and psychiatric disorders. *American Journal of Sociology*, **81**, 1447–1454.

Dohrenwend, B. P., & Shrout, P. E. (1985). "Hassles" in the conceptualization and measurement of life stress variables. *American Psychologist*, **40**, 780–785.

Dohrenwend, B. S., & Dohrenwend, B. P. (1981). *Stressful life events and their contexts*. New Brunswick, NJ: Rutgers University Press.

Dohrenwend, B. S., Dohrenwend, B. P., Dodson, M., & Shrout, P. E. (1984). Symptoms, hassles, social supports, and life events: Problems of confounded measures. *Journal of Abnormal Psychology*, **93**, 222–230.

Funk, S. C., & Houston, B. K. (1987). A critical analysis of the hardiness scale's validity and utility. *Journal of Personality and Social Psychology*, **53**, 572–578.

Gammon, G. D., John, K., Rothblum, E. D., Mullen, K., Tischler, G. L., & Weissman, M. M. (1983). Use of a structured diagnostic interview to identify bipolar disorder in adolescent inpatients: Frequency and manifestations of the disorder. *American Journal of Psychiatry*, **140**, 543–547.

Ganellen, R. J., & Blaney, P. H. (1984). Hardiness and social support as moderators of the effects of life stress. *Journal of Personality and Social Psychology*, **47**, 156–163.

Green, B. L., Lindy, J. M., & Grace, M. C. (1985). Posttraumatic stress disorder: Toward DSM-IV. *Journal of Nervous and Mental Disease*, **173**, 406–411.

Herjanic, B., Herjanic, M., Brown, F., & Wheatt, T. (1975). Are children reliable reporters? *Journal of Abnormal Child Psychology*, **3**, 41–48.

Herjanic, B., & Reich, W. (1982). Development of a structured psychiatric interview of children: Agreement between child and parent on individual symptoms. *Journal of Abnormal Child Psychology*, **10**, 307–324.

Holmes, T. H., & Masuda, M. (1974). Life change and illness susceptibility. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), *Stressful life events: Their nature and effect* (pp. 45–72). New York: Wiley.

Hudgens, R. W. (1974). Personal catastrophe and depression: A consideration of the subject with respect to medically ill adolescents, and a requiem for retrospective life events studies. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), *Stressful life events: Their nature and effects* (pp. 110–134). New York: Wiley.

Hull, J. G., Van Treuren, R. R., & Propsom, P. M. (1988). Attributional style and the components of hardiness. *Personality and Social Psychology Bulletin*, **14**, 505–513.

Hull, J. G., Van Treuren, R. R., & Virnelli, S. (1987). Hardiness and health: A critique and alternative approach. *Journal of Personality and Social Psychology*, **53**, 518–530.

Hunter, N. L., & Locke, S. E. (1984). Health locus of control: A potential moderator variable for the relationship between life stress and psychopathology. *Psychotherapy and Psychosomatics*, **41**, 186–194.

Kessler, R. C., & McRae, J. A., Jr. (1981). Trends in the relationship between sex and psychological distress: 1957–1976. *American Sociological Review*, **46**, 443–452.

Kobasa, S. C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology*, **37**, 1–11.

Kobasa, S. C. (1980). *Stress resistance among army officers*. Unpublished manuscript, University of Chicago.

Kobasa, S. C. (1982). Commitment and coping in stress resistance among lawyers. *Journal of Personality and Social Psychology*, **42**, 707–717.

Kobasa, S. C., & Maddi, S. R. (1982). *Hardiness measurement*. Unpublished manuscript, City University of New York, Graduate School and University Center.

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology*, **42**, 168–177.

Kubitz, K. A., Peavey, B. S., & Moore, B. S. (1986). The effect of daily hassles on humoral immunity: An interaction moderated by locus of control. *Biofeedback and Self-Regulation*, **11**, 115–123.

Larson, K. T., Schellenberg, R. P., & Markley, R. P. (1987, August). *Relationships between hardiness and coping*. Paper presented at the annual convention of the American Psychological Association, New York.

Maguire, G. P., Lee, E. G., Bevington, D. J., Kuchenmann, C. S., Crabtree, R. J., & Cornell, C. E. (1978). Psychiatric problems in the first year after mastectomy. *British Medical Journal*, **1**, 963–965.

Mirsky, A. F., & Duncan, C. C. (1986). Etiology and expression of schizophrenia: Neurobiological and psychosocial factors. *Annual Review of Psychology*, **37**, 291–319.

Mizes, J. S. (1988). Personality characteristics of bulimic and non-eating-disordered female controls: A cognitive behavioral perspective. *International Journal of Eating Disorders*, **7**, 541–550.

Nowack, K. M. (1986). Type A, hardiness, and psychological distress. *Journal of Behavioral Medicine*, **9**, 537–548.

Okun, M. A., Zautra, A. J., & Robinson, S. E. (1988). Hardiness and health among women with rheumatoid arthritis. *Personality and Individual Differences*, **9**, 101–107.

Parkes, C. M. (1975). Unexpected and untimely bereavement: A statistical study of young Boston widows and widowers. In B. Schoenberg, I. Gerber, A. Wiener, A. H. Kutscher, D. Peretz, & A. C. Carr (Eds.), *Bereavement: Its psychosocial aspects* (pp. 119–138). New York: Columbia University Press.

Parkes, C. M., & Weiss, R. S. (1983). *Recovery from bereavement*. New York: Basic Books.

Pedhazur, E. J. (1982). *Multiple regression in behavioral research*. New York: Holt, Rinehart, & Winston.

Rhodewalt, F., & Agustsdottir, S. (1984). On the relationship of hardiness to the Type A behavior pattern: Perception of life events versus coping with life events. *Journal of Research in Personality*, **18**, 212–223.

Rhodewalt, F., & Zone, J. B. (1989). Appraisal of life change, depression, and illness in hardy and nonhardy women. *Journal of Personality and Social Psychology*, **56**, 81–88.

Rice, F. P. (1990). The adolescent: Development, relationships, and culture (6th ed.). Boston: Allyn and Bacon.

Rich, V. L., & Rich, A. R. (1985, August). *Personality hardiness and burnout in female staff nurses*. Paper presented at the annual convention of the American Psychological Association, Los Angeles.

Schlosser, M. B., & Sheeley, L. A. (1985, August). *The hardy personality: Females coping with stress*. Paper presented at the annual convention of the American Psychological Association, Los Angeles.

Schmied, L. A., & Lawler, K. A. (1986). Hardiness, Type A behavior, and the stress-illness relationship in working women. *Journal of Personality and Social Psychology*, **51**, 1218–1223.

Sylvester, C. E., Hyde, T. S., & Reichler, R. J. (1987). The Diagnostic Interview for Children and Personality Inventory for Children in studies of children at risk for anxiety disorders or depression. *Journal of the American Academy of Child and Adolescent Psychiatry*, **26**, 668–675.

Van Treuren, R. R., & Hull, J. G. (1987, August). *Hardiness and the perception of symptoms*. Paper presented at the annual convention of the American Psychological Association, New York.

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review*, **96**, 234–254.

Welner, Z., Reich, W., Herjanic, B., & Jung, K. G. (1987). Reliability, validity, and parent-child agreement studies of the Diagnostic Interview for Children and Adolescents (DICA). *Journal of the American Academy of Child and Adolescent Psychiatry*, **26**, 649–653.

Manuscript received July 17, 1990; revised December 12, 1990.