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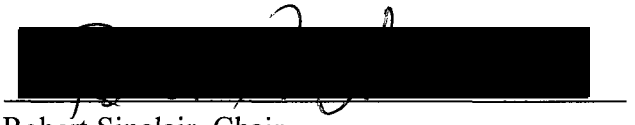
DISSERTATION APPROVAL

The abstract and dissertation of Celina Marie Oliver for the Doctor of Philosophy in Systems Science: Psychology were presented July 8, 2009, and accepted by the dissertation committee and the doctoral program.

COMMITTEE APPROVALS:



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ABSTRACT

An abstract of the dissertation of Celina Marie Oliver for the Doctor of Philosophy in Systems Science: Psychology presented July 8, 2009

Title: Hardiness, Well-Being, and Health: A Meta-analytic Summary of Three Decades of Research

In recent decades, as scientific understanding regarding the effects of stress on health and well-being has grown, researchers have shown increasing interest in personal factors such as hardiness that may enhance one's ability to remain resilient under stressful conditions. Hardiness is a complex trait composed of three components (commitment, control, and challenge) that combine synergistically to increase stress tolerance. Over time, a large and complex body of research has accumulated, and while many qualitative reviews have been conducted, quantitative summaries remain rare. This study provides an empirical synthesis of research findings examining the relationships between hardiness and correlates related to physical health (global health perceptions and illness) and well-being across multiple domains (subjective well-being, job satisfaction, psychological distress, and burnout).

A series of meta-analyses were conducted to generate weighted mean correlations (estimates of ρ) and to test several potential moderators, including

generation of hardiness instrument, assessment category for correlates (e.g., cognitive vs. affective well-being), sample characteristics (e.g., students, older adults, military), gender, and publication status. Reporting source (self vs. objective sources) and type of symptoms assessed (medical vs. somatic) were also tested as potential moderators for the physical health correlate. Additional analyses were performed to obtain estimates of ρ for each of the hardiness components (commitment, control, and challenge) with health and well-being.

Results suggest hardiness is moderately related to well-being and modestly (but significantly) related to physical health. Weighted mean correlations for the hardiness composite with selected correlates were: SWB = .46, distress = -.43, job satisfaction = .40, burnout = -.46, physical health = .30, and illness/injury = -.24. Results suggest the conceptual model underlying measures used to assess hardiness and other constructs may influence the relationships observed. Further, when components were analyzed, the challenge component consistently showed the weakest relationships and commitment the strongest with all correlates included, although evidence regarding consistency was more mixed. Overall, findings from this meta-analysis help to explain some of the variability in results and suggest several directions for future research.

HARDINESS, WELL-BEING, AND HEALTH: A META-ANALYTIC SUMMARY OF THREE DECADES OF RESEARCH

by

CELINA MARIE OLIVER

A dissertation submitted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY
in
SYSTEMS SCIENCE: PSYCHOLOGY

Portland State University
2009

DEDICATION

In loving gratitude, this dissertation is dedicated to my husband, Donovan Oliver. His unwavering support has kept me going all the way down this long, long road. I could not have done this without him. This is *our* achievement.

ANCKNOWLEDGEMENTS

I would like to thank the members of my committee whose expertise and guidance made this project possible: Robert Sinclair (Industrial/Organizational Psychology, Chair), Todd Bodner (Quantitative Psychology), Cynthia Mohr (Social Psychology), Wayne Wakeland (Systems Science), and Alan Cabelly (Business Administration: Management). All have been generous with their time and support throughout a long and difficult process. Their ideas, suggestions, and assistance in navigating around (or occasionally through) pitfalls have proven invaluable and I will always be grateful.

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INTRODUCTION

In recent decades, as medical and social scientists have gained a better understanding of the effects of stress on various dimensions of health and well-being, interest in factors that influence stress vulnerability and resilience has increased dramatically. Pioneering work by Holmes, Rahe, and their colleagues during the 1960's showed that the risk of illness was higher among individuals who experienced multiple life events (e.g., Rahe, Meyer, Smith, Kjaer, & Holmes, 1964). A life event is any event that necessitates major adjustments in one's lifestyle such as marriage, divorce, promotion, birth of a child, moving to a different city, starting college, etc. The Holmes and Rahe studies sparked an explosion of research focusing on the link between exposure to stressors and health status. Throughout the 1970's, the expansion of stress research in psychology, sociology, epidemiology, medicine, and other disciplines reflected a growing awareness of the potentially damaging effects of stress. Further, researchers in health psychology and other disciplines have continued to raise awareness of the multidimensional nature of health and to emphasize the importance of attending to multiple aspects of health in the physical and psychological domains (e.g., Alexander, 1984; Anderson & Armstead, 1995; Goldstein, DePue, Kazura, & Niaura, 1998; Matarazzo, 1984; Salovey, Rothman, & Rodin, 1998). Increasingly, researchers in occupational safety and health, industrial/organizational psychology, health psychology, epidemiology and other fields have emphasized the importance of exploring the effects of stress in the work domain as well.

One area of research that has attracted considerable scientific interest is the influence of individual differences in the stress response process on outcomes related to health and well-being (e.g., Byrne, 2000; Eaker, Haynes, & Feinleib, 1983; Houston & Snyder, 1988; Rebollo & Boomsa, 2006; R. Williams, Barefoot, & Schneiderman, 2003). Early efforts focused exclusively on vulnerability factors. That is, the negative effects of personality traits, attribution styles, and other psychological characteristics on various aspects of physical and mental health (i.e., the presence or absence of psychological distress) were extensively examined. For instance, numerous studies have focused on the greater prevalence of cardiovascular disease among individuals displaying the Type A (or coronary prone) behavior pattern (e.g., Emdad, 1998; Fredrikson, Wik, & Fischer, 1999; Keltikangas-Jarvinen, 2002; Littman, 1998; Sangenberg, Shuda, & Robbertze, 1997; Whiteman, Deary, & Fowkes, 2000). However, Kobasa and other stress researchers questioned the wisdom of looking exclusively at factors increasing vulnerability and turned their attention to factors that might support stress resilience (e.g., Allred & Smith, 1989; A. Antonovsky, 1985; H. Antonovsky & Sagy, 1986; Ganellen & Blaney, 1984; Gentry & Kobasa, 1984; Holahan & Moos, 1985; Kobasa, 1982, 1985; Kobasa, Maddi, & Zola, 1983; Kobasa & Puccetti, 1983; Maddi, 1987; Maddi & Kobasa, 1984; Nowack & Hanson, 1983; Rhodewalt & Augustdottir, 1984). Thus, the concept of hardiness was born.

Hardiness is a personality trait (sometimes referred to as a cognitive style) that enhances stress tolerance. This meta-construct is composed of three components (commitment, control, and challenge) that combine synergistically to increase

resilience in the face of stressors. Thus, relative to their less hardy counterparts, hardy individuals are able to function better both physically and psychologically when they encounter very demanding environments. Hardiness researchers seek to understand why some people exposed to stressful environments suffer while others thrive. In exploring this question, researchers have examined many different aspects of the stress response process and produced a wide variety of findings.

Theoretical controversies are likely to develop in any complex and well-developed research stream and hardiness is no exception. Over the years, researchers have discussed and at times debated the basic nature of hardiness, the mechanisms involved, possible confounding influences, the effectiveness of different instruments in measuring the construct, the relative merits of using components vs. composite scores to measure hardiness, inconsistencies in observed relationships between hardiness and physiological indicators, the relative effectiveness of hardiness in different life domains, and possible differences in the way hardiness operates for people of different genders, ages, ethnicities, or occupations. Some of these controversies have been more or less resolved while for others, inconsistencies in the literature remain largely unexplored. Thus, the purpose of this study is to investigate some of these inconsistencies through meta-analysis.

Why a Meta-Analysis?

Over the years, many qualitative reviews of the hardiness literature have been conducted (e.g., Funk, 1992; Kobasa, 1982, 1985, 1987; Lambert & Lambert, 1999;

Maddi, 1998, 2002; Maddi & Kobasa, 1984; Orr & Westman, 1990; Ouellette, 1993; Tartasky, 1993; Younkin & Betz, 1996), but there remains a dearth of quantitative reviews/studies, such as meta-analyses. This represents an important gap as meta-analytic techniques are often better suited to investigate questions involving large numbers of studies, particularly when findings from studies examining the same phenomena are diverse (cf., Glass, McGaw, & Smith, 1981). Meta-analysis techniques allow researchers to aggregate data across many studies and estimate mean effect sizes, thus removing some of the subjectivity and educated guesswork when addressing issues currently under debate. Several authors have noted that qualitative reviews tend to focus on results of statistical significance tests (a procedure sometimes referred to as vote counting) when evaluating relationships between constructs (Hedges & Olkin, 1985; Lipsey & Wilson, 2001; Wilson, n.d.). This method is problematic because significance tests are highly dependent on sample sizes and they use arbitrary cutoff values (e.g., $p < .05$). In contrast, meta-analyses provide more informative results by focusing on the direction and magnitude of effects across studies. Thus, the strength, pattern, and consistency of results are all considered. Rosenthal (1991) provides an apt description of the advantages of supplementing traditional reviews with meta-analytic work:

> There is nothing in the set of meta-analytic procedures that makes us less able to engage in creative thought. All the thoughtful and intuitive procedures of the traditional review of the literature can also be employed in a meta-analytic review. However, meta-analytic reviews go beyond the traditional reviews in

the degree to which they are more systematic, more explicit, more exhaustive, and more quantitative. (p. 11)

In the case of hardiness, several researchers have provided excellent reviews, critiques, and interesting theoretical propositions to be tested. However, the depth and complexity of the information now available makes it rather difficult to discern patterns of findings in the literature or to develop an adequate understanding of the relationships between hardiness and frequently studied outcomes. Meta-analysis is particularly well-designed to address this kind of problem as it provides a mechanism for empirically evaluating both the strength and the consistency of relationships observed across many different studies. Therefore, the goal of this study was to generate an empirical synthesis of research findings examining the relationships between hardiness and correlates related to physical health (global health perceptions and illness/injury) and well-being across multiple domains (subjective well-being, job satisfaction, psychological distress, and burnout).

Overview of Hardiness Theory

The hardiness construct was first introduced by Kobasa (1979a, 1979b) based on findings from a study of middle and upper level managers at Illinois Bell who were experiencing high levels of stress due to major organizational changes in the wake of the breakup of AT&T. Kobasa was interested in identifying a resilient group (those who did not become ill when exposed to chronically high levels of stress) and determining how they differed from their less robust counterparts. Participants in this

study completed an extensive battery of psychological tests. Discriminant function analysis revealed significant differences between the group of managers who became ill and those who remained healthy. Managers who remained healthy displayed high levels of commitment (a sense of meaningfulness combined with a tendency to be fully engaged in life's everyday activities), control (feelings of generalized self-efficacy and an internal locus of control), and challenge (appraising change and other stressful events as opportunities for growth rather than as threats to be avoided). In searching for a theoretical framework for interpreting this constellation of attributes, Kobasa found that existential psychology offered the most useful guidance.

Existential Psychology

In the existential view of psychology, finding meaning in life is seen as a primary goal (Orr & Westman, 1990). Individuals create meaning through the decisions they make in their daily lives. Existentialism sees people as "beings-in-the-world," who continuously and dynamically construct their personalities through their actions, rather than carrying around a set of static internal traits (Kobasa, 1982). Over time, as patterns accumulate, "more pervasive meaning systems and general directions emerge" (Maddi, 2002, p. 175). In other words, people develop mental models that systematically influence their decision patterns (Senge, 1990) and developmental trajectories.

For each decision a person faces (and the subsequent actions taken), the individual must choose a path, either "the future" with all of its unknowns, or a

continuation of a more familiar path from the past. These meaning systems create developmental trajectories or paths that allow for greater (or less) personal growth. Consistently choosing the future (the less familiar path rather than a "tried and true" path from the past) leads to ongoing personal development and is therefore considered the most desirable pattern. However, future-oriented decisions also create uncertainty and arouse anxiety. For example, an individual deciding whether to pursue a job opportunity in a different industry or continue in a job that is adequate but routine faces a choice between uncertainty with the potential for growth or continuing on a safer path that fulfills her/his needs but does not introduce new challenges. Turning down the new job will probably result in some guilt as an important developmental opportunity has been missed, but this may seem like less of a problem than the anxiety associated with facing an uncertain future. According to Maddi (2002), existential courage (willingness to confront the anxiety invariably created when an individual faces the unknown) provides the necessary motivation to regularly propel a person toward the less certain but more developmentally valuable "future-oriented" choices. Existential courage lies at the heart of authenticity.

Authentic people are courageous and strenuously engaged with life. They develop and maintain attitudes and goals that are aligned with a sense of personal responsibility, caring, involvement, and a value for constant striving. They seek out challenges (difficult but surmountable environmental demands) and see change as an incentive for growth (Kobasa, 1982; Orr & Westman, 1990). This authenticity gives hardy people the ability to remain engaged and maintain a sense of connection when

confronted with life's hard facts. Authentic individuals also believe they can exert control over events (both external and internal), which enables them to interpret stressful events as challenges, rather than as threats. The developmental histories of authentic or hardy people allow them to be more open to experience on a variety of levels. They are more confident in their sense of their sense of self and their place in the social world. This gives them the ability to avoid being threatened or psychologically disrupted by difficult or painful experiences and thus provides them with greater resilience when under stress (Bartone, 2000).

The 3Cs of Hardiness

The hardiness trait is defined as a constellation of three attitudes: commitment, control, and challenge (Kobasa, 1979a, 1979b). These attitudes reflect deeply held beliefs that influence the way people interpret stressful events. High levels of commitment enable individuals to "believe in the truth, importance, and interest value of who one is and what one is doing, and thereby the tendency to involve oneself fully in the many situations of life, including work, family, interpersonal relationships, and social institutions" (Kobasa, 1987, p. 6). Commitment engenders feelings of excitement along with a strong sense of community and motivation to remain engaged during difficult times (Kobasa, 1982, 1985).

Control enhances motivation to engage in effortful coping because it predisposes the individual to view stressors as changeable (Kobasa, 1982; Maddi, 2002; Maddi & Kobasa, 1984). Hardy individuals feel that attempting to control or

change a demanding or undesirable situation (rather than fatalistically accepting the outcome) falls within their scope of personal responsibility. "Control allows persons to perceive many stressful life events as predictable consequences of their own activity and, thereby, as subject to their direction and manipulation" (Kobasa, 1982, p. 7). When faced with difficulties, high control individuals are more likely to feel capable of acting effectively on their own. They reflect on how to turn situations to their advantage rather than taking things at face value (Maddi & Kobasa, 1984).

Challenge generates a zest for facing up to (or even seeking out) difficult experiences because they are seen as opportunities for personal growth rather than as potential threats to security (Maddi, Khoshaba, Perisco, Lu, Harvey, & Bleeker, 2002). Thus, individuals who expect to thrive must learn to embrace the strenuousness of "authentic living," drawing strength from difficulties previously faced and successfully overcome rather than looking for ways to avoid stressful events. Individuals high in challenge are motivated to become catalysts in their environments and to practice responding to the unexpected. They are apt to more thoroughly explore their surroundings in an ongoing search for new and interesting experiences. As a result, they know where to turn for resources to aid them in coping with stress. High challenge individuals are characterized by cognitive flexibility and tolerance for ambiguity. This allows them to more easily integrate unexpected or otherwise stressful events (Kobasa, 1982; Maddi, 1999).

Hardiness and Coping

Although the relationship between hardiness and coping is not examined in this meta-analysis, some explanation is needed to clarify how hardiness may influence health and well-being. Hardiness theorists propose that hardiness influences the relationship between stressors and strain primarily through its effect on appraisal and coping process. Within the hardiness literature, coping and appraisal processes are subsumed under the rubric of coping strategies (Maddi & Kobasa, 1984). Coping strategies include primary appraisals (challenge or threat appraisals), secondary appraisals (assessments regarding the adequacy of available resources for dealing with environmental demands) and the actions taken in response to those stressors (Lazarus & Folkman, 1984). Hardiness allows the individual to appraise stressors in a way that minimizes the level of threat perceived and limits the amount of negative arousal experienced (Kobasa, 1982). Thus, hardy individuals are expected to interpret stressful events as being less threatening and more controllable (Kobasa, 1979b, 1982; Maddi, 1987; Maddi & Kobasa, 1984). Further, hardy individuals are more likely to choose adaptive (or transformational) coping strategies over avoidant (or regressive) methods (e.g., Gentry & Kobasa, 1984; Kobasa, 1979a, 1979b, 1982, 1985; Kobasa & Puccetti, 1983; Maddi, 1987, 2002; Maddi, Kahn, & Maddi, 1998; Maddi & Kobasa, 1984).

Transformational vs. regressive coping. According to hardiness theory, hardiness reduces organismic strain among individuals exposed to high levels of stress by promoting active (transformational) coping rather than regressive coping (Maddi & Kobasa, 1984). Within the hardiness literature, regressive coping is defined as coping

strategies and efforts that reflect avoidance or passivity (e.g., mental or behavioral disengagement or avoidance, passive acceptance or resignation). In contrast, transformational coping begins with a realistic appraisal of stressful events coupled with confidence in one's ability to muster the resources necessary to cope effectively. Rather than withdrawing or passively accepting a stressful situation without attempting to change it, individuals engaged in transformational coping actively confront stressors and search out resources that will enable them to either change the outcome or reinterpret the event in a more positive way, lessening the impact of difficult, unwanted, or demanding events. In other words, they seek ways to adjust either the course of events or their perceptions of these events in order to make them less stressful (e.g., Maddi, 1999).

Although the empirical evidence is somewhat inconsistent when specific coping strategies are examined (cf., Maddi & Hightower, 1999), several studies suggest that in general, hardy people appraise stressful events differently and gravitate toward more active coping strategies. Hardy individuals report experiencing events as less threatening and feel more optimistic about their ability to cope (Florian, Mikulincer, & Taubman, 1995; Rhodewalt & Zone, 1989). They also rely more on adaptive (transformational) coping strategies such as problem-focused coping and support-seeking and are less likely to use passive (regressive) coping strategies such as emotion-focused coping and distancing (Mills, 2000; Westman, 1990; Wiebe, 1991).

Summary

Hardiness has emerged as an important stress resilience construct that has attracted a high level of sustained research attention. Over the years, a rich and complex literature has evolved, but its very richness sometimes makes it difficult for researchers to identify clear patterns in the data. Several authors have provided excellent qualitative reviews of the hardiness literature discussing patterns, problems, and issues requiring more investigation. The focus of the current study is to build upon those qualitative reviews and empirically examine frequently studied stress-related correlates that I believe can be more clearly and succinctly addressed through quantitative analysis. These core themes are described in the next chapter.

THE PRESENT STUDY

As discussed in the previous chapter, numerous debates have emerged in the hardiness literature over the years. While many of these issues could be explored through quantitative integration techniques, it is not feasible to address such an extensive variety of issues in a single study. However, two major themes stand out as being both scientifically interesting and pragmatically feasible, given the available data. First, I believe there is a need to establish a population estimate of the strength of the relationships between hardiness and indices of physical and psychological health. These represent some of the most widely studied correlates of hardiness, and the wealth of available data makes it difficult to summarize through non-quantitative methods. Thus, the first stage of this project involved establishing estimates of the mean correlations between hardiness and (a) physical health and (b) positive and negative aspects of well-being – both in general and in the work domain. Further, because many authors have noted that some components of hardiness appear to be stronger and more consistent predictors of outcomes relating to stress, health, and well-being than others (e.g., Funk & Houston, 1987; Lachman, 1996; C. Lambert & Lambert, 1999; Lawler, Kline, Harriman, & Kelly, 1999; Lightsey, 1996; Tartasky, 1993; Wagnild & Young, 1991), I established estimates of the strength of the relationship between each of the hardiness components and outcomes from these domains.

RQ 1: What are the weighted mean correlations between hardiness and indices of positive and negative well-being?

RQ 2: What are the weighted mean correlations between hardiness and physical health or symptoms of illness/injury?

The second major theme addresses potential moderators in the relationships between hardiness and correlates of interest, with particular emphasis on instrumentation. Both the hardiness measure employed and the conceptual model underlying indices of health and well-being employed have the potential to introduce systematic differences in the relationship between hardiness its correlates. Meta-analysis techniques are particularly suitable for exploring this issue.

Over the years researchers have created several "generations" of hardiness instruments and each generation has incorporated refinements derived from previous critiques and research findings. While this incremental improvement process is highly desirable from a scientific standpoint, it creates concerns that some instruments may produce systematically different results than others. It is possible that some of the conflicting findings observed over the years stem from attempts to directly compare results across studies using instruments of varying psychometric quality.

Another problem presents itself when one examines the measures used to assess health and well-being related correlates. As described below, instruments designed to measure constructs such as well-being, psychological distress, burnout, or even symptoms of illness or injury are sometimes based on very different conceptual

models. Difficulties may arise if there are differences in the relationships between hardiness and the constructs represented by these varied conceptual models. These models are described in the following sections. Finally, several demographic characteristics have been identified by hardiness researchers as potential moderators. Therefore, I conducted additional exploratory analyses when sufficient studies were available.

RQ3: Does instrumentation moderate the relationship between hardiness and indicators of positive and negative well-being?

RQ4: Does instrumentation moderate the relationship between hardiness and physical health?

RQ5: Do demographic characteristics moderate the relationship between hardiness and well-being or physical health?

Core Theme 1: Relationships of Hardiness with Well-Being and Physical Health

Hardiness and Well-Being

Hardiness researchers have shown a strong and enduring interest in issues relating to well-being both in general and in the work domain. After examining the literature, I found that within each domain, one broad but theoretically well defined construct was most commonly examined and these indices were selected for the current study. For the general well-being criteria, I examined indicators of subjective well-being (described below) and psychological distress (depression, hopelessness,

anxiety, negative affect). Criteria related to well-being in the work domain included job satisfaction and burnout (a meta-construct consisting of emotional exhaustion, depersonalization/cynicism, and professional inefficacy/diminished feelings of personal accomplishment). While these research streams have been addressed in narrative reviews, there is a large enough volume of available data that statistical summaries are useful.

Subjective Well-Being

The concept of subjective well-being (SWB) was formally articulated in an influential review by Diener (1984). He noted that most of the literature on SWB is concerned with understanding how and why people experience their lives in positive ways, including both cognitive evaluations and affective reactions. Thus, the subjective well-being literature encompasses a wide variety of quality of life indices such as happiness, life satisfaction and positive affect. According to Diener, the construct of SWB has three hallmarks: it is a subjective experience (i.e., dependent on the person's perceptions rather than objective aspects of the individual's personal characteristics or environment), it includes positive measures (i.e., not just an absence of negative factors such as emotional distress), and it typically involves a global assessment of the person's life (i.e., it is not limited to a specific domain such as marital satisfaction). Further, there are three components to the underlying structure: positive affect, negative affect, and life satisfaction.

Although there are exceptions, most instruments designed to measure subjective well-being focus on either the cognitive or the affective aspects, but not both (Diener, 1984). While affective and cognitive SWB measures typically show moderate correlations with one another, these two types of measures represent different underlying theoretical approaches. A thorough description and comparison of the relative merits and theoretical foundations of each approach is beyond the scope of this meta-analysis. However, I briefly describe each class of instrument because the strength of the relationship between hardiness and SWB may vary depending on the type of measure used.

Affectively-based instruments equate subjective well-being with emotional well-being, defining SWB as the predominance of positive affect over negative affect. That is, higher levels of SWB are associated with experiencing positive affect more often, more intensely, and/or for longer periods of time relative to negative affect (e.g., Affect Balance Scale, Brandburn, 1969; Affectometer, Kamman & Flett, 1983; Mood Survey, Underwood & Froming, 1980). In contrast, cognitively-based instruments focus on the individual's evaluations of general quality of life, either by assessing and combining multiple domains such as satisfaction with one's job, marriage, lifestyle, health, social support structure, and accomplishments (e.g., Life Satisfaction Inventory, Neugarten, Havighurst, & Tobin, 1961) or through global assessments of overall satisfaction (e.g., Satisfaction with Life Scale, Diener, Emmonds, Larsen, & Griffin, 1983).

Given that hardiness is a cognitive style, it may seem obvious to hypothesize that it will show relatively strong relationships with cognitively-based measures of SWB and weaker relationships with affectively-based measures. However, Lightsey's (1996) process theory provides a bridge between the cognitive and affective aspects of SWB and suggests that they are so deeply interconnected that, to some degree, measures of one may serve as a proxy for the other. According to process theory, persistent thoughts lead to patterns of beliefs, which in time form schemata or mental models to use the systems science term (Senge, 1990). Mental models represent implicit theories of the world. These models are preconscious (i.e., accessible only when one makes a special effort to bring them to mind) and systematically influence cognitive appraisals, which are, in turn, closely related to affect. Together, schemata and appraisals represent an information processing system that strongly influences emotions, and hence, affective regulation and behavior. Similar to affect-based measures of SWB, process theory assumes that mental and physical well-being depend upon relatively greater activation of the biological reward system (i.e., positive thoughts, beliefs, mental models, and affect) than the harm-avoidance system (negative thoughts, beliefs, mental models, and affect). Thus, people who form mental models that predispose them to make more positive appraisals (e.g., hardy individuals) are also likely to experience higher levels of *both* cognitive and affective well-being. Further, although it is possible that the type of SWB measure moderates the hardiness-SWB relationship, the tenets of process theory suggest otherwise.

H_{1a}: Hardiness and subjective well-being will be significantly positively correlated.

Psychological Distress

The relationship between hardiness and psychological distress is one of the most frequently investigated relationships in the hardiness literature. Most researchers agree that hardiness shows a moderately strong negative correlation with psychological distress. However, within the hardiness literature, distress has been operationalized in a variety of ways (e.g., depression, anxiety, hopelessness, negative affect), making narrative comparisons more difficult. Although hardiness theory does not directly address the question of whether hardiness should show similar relationships with different types of distress, Beck has proposed a cognitive profile theory that is highly compatible with hardiness and provides some useful guidelines for conducting empirical tests.

Similar to Lightsey's (1996) process theory, the cognitive specificity hypothesis (A. Beck, 1976, 1991) assumes that cognitive processes mediate all emotional and behavioral responses. Thus, Beck and colleagues view cognitive processes as crucial in precipitating and maintaining some maladaptive psychological states (e.g., A. Beck & Clark, 1988; Riskind & Alloy, 2006). Vulnerable individuals are expected to experience depression or anxiety when dysfunctionally negative mental models (schemata) are activated through the occurrence of daily events. Based on extensive clinical observation and experimental evidence, Beck and other

researchers (e.g., A. Beck, Brown, Steer, Eidelson & Riskind, 1987; A. Beck, Wenzel, Riskind, Brown, & Steer, 2006; Derry & Kuiper, 1981; Greenberg & Beck, 1989; Riskind & Williams, 2005; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000) have argued that when these maladaptive mental models are active, they systematically bias all stages of information processing, giving rise to negatively toned automatic thoughts (which the individual is typically only vaguely aware of) followed almost immediately by intense negative affect (which the individual is acutely aware of; A. Beck, 1991).

The cognitive specificity model also assumes that depression, anxiety, and general distress are associated with different mental models and that each cognitive profile gives rise to different kinds of automatic thoughts and emotional responses. Individuals who are vulnerable to depression often possess belief systems centering on themes of loss, deprivation, and defeat (A. Beck, et al., 1987; Greenberg & Beck, 1989), coupled with unusually low levels of positive affect (A. Beck & Clark, 1988; R. Beck, Benedict, & Winkler, 2003). In contrast, anxious individuals are prone to creating and activating danger schemata. As a result, they are more likely to focus on potential physical and psychological threats, experience an enhanced sense of vulnerability, and underestimate their ability to cope (A. Beck & Clark, 1988; Riskind, 1997; Riskind & Alloy, 2006). This approach also assumes that psychopathological conditions such as depressive or anxiety disorders represent extreme versions of normal, adaptive responses and belief systems. Thus, it presupposes a continuum running from adaptive mental models, an absence of distress, and functional coping

responses to highly maladaptive mental models giving rise to a dysfunctional internal dialog, ineffective coping strategies, and high levels of distress.

Proponents of the cognitive specificity hypothesis argue that depression and anxiety disorders manifest different symptoms and are related to distinct cognitive profiles, but they also acknowledge that these profiles not always easy to distinguish empirically, particularly in non-clinical populations (e.g., L. Clark, Watson, & Mineka, 1994; Watson, Clark, & Carey, 1988; Watson, Weber, Assenheimer, Clark, Straus, & McCormick 1995). This lack of discriminant validity is probably partly due to frequent comorbidity issues (i.e., individuals suffering from depression often suffer from anxiety and vice versa) and partly due to shared symptoms. Consequently, some researchers view these disorders as a unitary phenomenon with anxiety and depression occupying different positions on a single continuum (see D. Clark, Beck, & Stewart, 1990 for a review), but other researchers disagree. One alternative explanation of interest here is the tripartite model of psychological distress proposed by L. Clark and Watson (1991). According to the tripartite model, the symptom profiles of distressed individuals typically fall into one of three classifications or syndromes: depression, anxiety, and general affective distress.

Each syndrome has specific factors that distinguish it from the others. The depression syndrome is marked by low levels of positive affect (i.e., the loss of pleasurable engagement with one's environment) while thoughts related to loss or failure are experienced as absolute statements, (i.e., they typically include words like always and never), often accompanied by feelings of hopelessness, loneliness, and

sadness. The anxiety syndrome is associated with physiological hyperarousal and vigilance, while the individual's thoughts tend to focus on the uncertainty of future events or circumstances. The general distress syndrome is less differentiated and involves general demoralization, somatic complaints, and reactivity to negative stimuli. It encompasses a broad range of negative feelings such as inferiority and rejection, oversensitivity to criticism, self-consciousness, social distress, and at times depressed or anxious mood (D. Clark, Beck, & Stewart, 1990; L. Clark & Watson, 1991; L. Clark, Watson, & Mineka, 1994).

Hardiness can be viewed as an adaptive cognitive profile (mental model) but unlike the syndromes described above, it is not activated by specific events. That is, hardiness represents a cognitive style that introduces a systematic bias toward more optimistic patterns of appraisals of all life experiences. In contrast, several distress researchers have argued that some individuals develop maladaptive mental models that may become active in response to negative life events. Depression, anxiety, and hopelessness all involve specific patterns of negative bias in cognitive processing (e.g., A. Beck, 1991; A. Beck, Wenzel, Riskind, Brown, & Steer, 2006; Riskind, Williams, & Joiner, 2006) with vulnerable individuals frequently experiencing depressogenic or anxiety inducing automatic thoughts. The tripartite model adds the general distress syndrome, which is broader and includes a wider variety of negative cognitions and affective reactions.

Depression is associated with low positive affect and high negativity. Thus, hardiness could influence depression levels through both positive and negative

patterns of cognitions. In contrast, anxiety is considered a relatively pure marker of trait negative affect that is more closely related to physiological arousal. However, studies examining the relationship between hardiness and physiological correlates have produced conflicting findings (see Orr & Westman, 1990; Ouellette, 1993; Wiebe & Williams, 1992 for reviews). Therefore, hardiness may show a more consistent (negative) relationship with depression than anxiety. On the other hand, anxious individuals tend to appraise many events as threatening and underestimate their ability to cope whereas hardy individuals appraise relatively few events as threatening and experience high coping efficacy. This may provide broad-based protection from anxiety-producing cognitions. Thus, at present, it is unclear whether hardiness will show a stronger relationship with one syndrome over the other.

General distress is closely associated with (and presumably strongly influenced by) neuroticism/negative affectivity. Like hardiness, this syndrome is likely to influence an individual's appraisal tendencies across a broad spectrum of experiences. In other words, it affects how the individual perceives and interacts with the world in general rather than intermittently, when dysfunctional mental models are active. As such, hardiness and the general distress syndrome represent very different characteristic appraisal patterns. Therefore, I expect hardiness to show a stronger relationship with general distress than with anxiety or depression.

H_{1b}: Hardiness and psychological distress will be significantly negatively correlated.

H_{1c}: Hardiness will show a stronger relationship with general distress than with depression or anxiety.

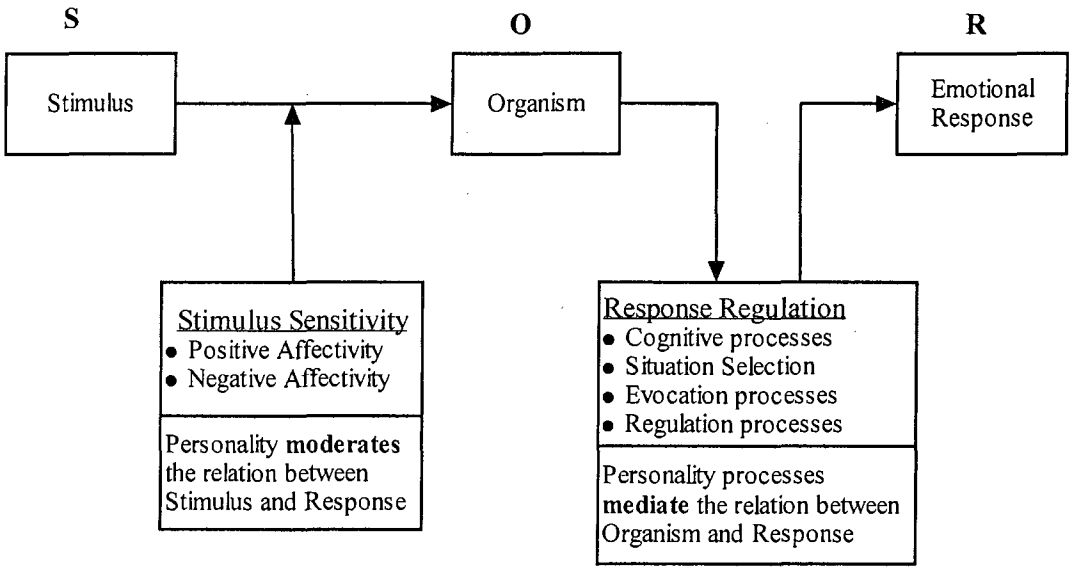
Job Satisfaction

Compared with outcomes such as subjective well-being and psychological distress, relatively few studies have examined the relationship between hardiness and indicators of work-related well-being such as job satisfaction. Despite its roots in the work domain, hardiness researchers have given less emphasis to work-related outcomes in general and work-related well-being outcomes in particular. Prior to the 1980's, job satisfaction research focused primarily on the influence of job characteristics and various aspects of the work environment. In contrast, the last few decades have seen a marked increase of interest in examining personality and other individual characteristics likely to systematically influence job satisfaction. This surge in interest was largely fueled by several studies showing moderate levels of stability in job satisfaction over time and across situations (e.g., Gerhart, 1987; Staw, Bell, & Clausen, 1986; Staw & Ross, 1985; Steel & Rentsch, 1997). As consensus regarding the importance of negative and positive affectivity has grown, researchers have turned their attention to understanding the influence of affectivity on job-related attitudes as a way to integrate findings from a variety of traits associated with work-related well-being (e.g., Connolly & Viswesvaran, 2000; Forgas & George, 2001; Moorman, 1993; Thoresen, Kaplan, Barsky, de Chermont, & Warren, 2003; van der Linden, Taris, Beckers, & Kindt, 2007).

One example is Judge and Larsen's (2001) Stimulus-Organism-Response (S-O-R) Model, which provides a useful theoretical model for integrating diverse research findings. This model assumes that affective processes are the most proximal influences on perception and behavior. By extension, personality traits are assumed to influence job satisfaction primarily through affective processes. Although an empirical test of the S-O-R Model is beyond the scope of this project, this model is useful as an organizing framework. Thus, a summary description is provided below.

As shown in Figure 1, the "Stimulus Sensitivity" section of the S-O-R Model is concerned with affectively-oriented traits that can moderate the individual's appraisals of incoming stimuli (Thoresen, et al., 2003). Positive and negative affectivity (PA and NA respectively) are seen as "generalized traits or average tendencies to react in certain ways to specific classes of stimuli" (p. 76). Thus, when exposed to the same stimuli, some individuals appear to be predisposed to pay more attention to positive or negative features of the environment. Traits such as extraversion and neuroticism (which are associated with PA and NA respectively) are expected to moderate an individual's perceptions of her/his job experiences through their influence on attention and memory processes. That is, individuals with high NA are likely to experience especially strong reactions when exposed to negative stimuli while people who are high in PA tend to be more sensitive to positive stimuli.

Figure 1. S-O-R Model of Intrapersonal Influences on Job Satisfaction[1]



[1]Adapted From T. A. Judge and R. J. Larsen (2001), Dispositional affect and job satisfaction: a review and theoretical extension, *Organizational Behavior and Human Decision Processes, 86(1),* p. 84.

The focus of cognitively-oriented personality traits such as hardiness is represented primarily in the "Response Regulation" section. According to this model, traits like hardiness systematically influence how people perceive and evaluate information once it has been encoded and hence, how they respond both behaviorally and emotionally. For example, Judge and Locke (1993) found that dysfunctional thought processes (i.e., negative mental models as described in Beck's cognitive specificity hypothesis) mediated the relationship between affective disposition and job satisfaction. Further, Judge and Larsen have described four categories of mediating influences: cognition, selection, evocation, and regulation. Each of these mediating

influences is an immediate precursor to a positive or negative emotional reaction to events at work. Taken together, these emotional reactions determine the overall tone of the individual's perceptions of work-related well-being (i.e., satisfied vs. dissatisfied).

As implied by the name, cognition refers to thought processes that create differences between people in how they appraise and evaluate various job experiences (e.g., selective attention, appraisal and attributional styles, social comparison processes). Individuals may also self-select into different kinds of situations that are likely to elicit different types of emotional reactions. For instance, hardy individuals may actively seek out work environments providing higher levels of autonomy or more challenging opportunities. Evocation refers to processes involved in changing or influencing an existing situation – especially the social aspects. Hardiness theory postulates that hardy individuals are likely to take action to change situations that they see as undesirable and to project a "can do" attitude to others, thus increasing their opportunities to receive feedback boosting their self-confidence and self-esteem. Moreover, since hardy individuals welcome a challenge, they are more likely to set and attain "stretch goals," engendering an ongoing sense of accomplishment. Finally, regulation refers to coping strategies and emotional regulation. Hardy individuals are more likely to engage in effective coping strategies such as problem-focused coping (when the situation is amenable to change) or through cognitive reframing and use of adaptive emotion-focused coping strategies when personal influence is limited (e.g., optimistic reappraisals or counting one's blessings as opposed to dwelling upon

difficulties or continually venting one's feelings regarding unfair outcomes or unpleasant events).

Previous hardiness research supports for the role of hardiness in cognition (appraisal and re-appraisal processes), evocation (changing or influencing an existing situation), and regulation processes (emotional regulation). For example, Westman (1990) noted different appraisal patterns among hardy vs. non-hardy officer cadets. The appraisals of hardy cadets were more context dependent than their non-hardy counterparts. When preparing to cope with a difficult set of demands, they saw the event as equally (or more) stressful but their retrospective appraisals were more positive. Similarly, Rhodewalt and Zone (1989) noted that hardy individuals are less likely to appraise their experiences as undesirable, although there were no systematic differences in the number of negative life events encountered by hardy vs. non-hardy individuals. Finally, findings from a previous meta-analysis indicated that (a) hardy individuals' perceptions of daily hassles, life change events, traumas, and chronic stressors are less likely to produce strain and (b) hardy people are more likely to initiate actions to actively create positive outcomes (Mills, 2000).

As described in Figure 1, the S-O-R Model articulates several mechanisms through which cognitive traits such as hardiness could systematically influence an individual's ongoing appraisal processes (and hence, emotional responses) to stimuli in the workplace. Therefore, a moderately strong relationship between hardiness and job satisfaction might be anticipated. However, as Judge and Locke (1993) point out, most job satisfaction assessments are focused on cognitive assessments about job

characteristics (e.g., pay, supervision, tasks performed) rather than the individual's personal experiences within the job (e.g., pleasantness or unpleasantness of typical interpersonal interactions, emotional responses most frequently evoked by work events), so the influence of individual characteristics may be muted. Thus, I expect a significant but modest positive correlation between hardiness and job satisfaction.

H_{1d}: Hardiness and job satisfaction will be significantly positively correlated.

Burnout

As a rule, work-related outcomes have been less frequently explored within the hardiness literature than general well-being related criteria, but there are exceptions. Over time, job stress and strain researchers have maintained a strong interest in exploring the role of "resistance resources" such as hardiness in combating the deleterious effects associated with exposure to chronically stressful work environments, particularly in human services occupations such as clinical psychology, social work, or healthcare. Thus, there is an extensive body of research examining the relationship between hardiness and symptoms of strain such as burnout.

Burnout is a cumulative and progressive reaction to chronic job stress (Constantini, Solano, DiNapoli, & Bosco, 1997). The construct was originally proposed by Freudenberger who defined it as "a state of fatigue or frustration brought about by devotion to a cause, way of life, or relationship that failed to produce the expected reward" (1980, p. 13). Thus, idealistic individuals entering demanding professions with naïve expectations are likely to be the most vulnerable to burnout.

Various researchers have provided different conceptualizations of the burnout construct, although certain core themes have consistently emerged. Namely, burned out individuals frequently experience a profound sense of depletion which can manifest in physical, emotional, social, and cognitive symptoms. For example, someone experiencing burnout may feel physically tired and experience a wide variety of somatic symptoms, emotional distancing, negative attitudes, and callous insensitivity toward patients, clients, coworkers, or subordinates. Three inventories have been employed by researchers examining the hardiness-burnout relationship and thus, are of interest here. Two of these inventories, the Tedium Burnout Measure and the Staff Burnout Scale for Healthcare Professionals, propose a unidimensional structure for burnout while the Maslach Burnout Inventory represents burnout as a meta-construct consisting of three dimensions. Each of these assessment tools is described below.

The Tedium Burnout Measure (TBM; Pines, Aronson, & Kafry, 1981) defines burnout as a state of prolonged depletion resulting in exhaustion in the physical, emotional, and mental realms. Common symptoms of physical exhaustion include feeling fatigued or run down while emotional exhaustion is characterized by negative affective states such as hopelessness and depression or feeling trapped. Mental exhaustion has a more evaluative component as typified by feelings of worthlessness, disillusion, or resentment toward other people. In contrast to other burnout measures, the TBM views burnout as an existential phenomenon (i.e., failing to find meaning and a sense of worth from one's interactions with the world). While most burnout

measures focus on the work domain, the TBM employs a broader focus, assuming that burnout can result from unmet expectations in any aspect of one's life (Arthur, 1990; Pines, 1993).

The Staff Burnout Scale for Health Professionals (SBS-HP; Jones, 1980) views burnout as a syndrome of physical and emotional exhaustion leading to the development of negative job attitudes, poor professional self-concept, and a loss of empathic concern toward clients or patients. Burnout is measured through the experience of adverse psychological, physiological, and behavioral events. Although this instrument provides a single, composite burnout score, the measure can be broken down into four conceptual domains: dissatisfaction with work, psychological and interpersonal tension, physical illness and/or distress, and unprofessional patient relationships.

The Maslach Burnout Inventory (MBI; Maslach, 1997) is the most widely used measure. This assessment instrument views burnout as a meta-construct consisting of three dimensions: emotional exhaustion, depersonalization/cynicism, and professional inefficacy, representing stress reactions (i.e., strain), interpersonal difficulties, and self-evaluative consequences respectively (Leiter & Maslach, 2001; Maslach, 2001; Maslach, Schaufeli, & Leiter, 2001).

Emotional exhaustion. People who are emotionally exhausted experience feelings of being overextended, having depleted emotional resources and, in many cases, chronic physical weariness. They often report feeling as if they cannot face another work day, another demand upon their time and energy, or another person in

need. Emotional exhaustion represents the basic stress dimension of the burnout syndrome and may be associated with various somatic symptoms such as headache, backache, gastrointestinal disorders, or insomnia (Duquette, Kerouac, Sandhu, & Line, 1994; Kelley, Eklund, & Ritter-Taylor, 1999; Leiter & Maslach, 2001; Maslach, Schaufeli, et al., 2001).

Depersonalization/cynicism. According to Leiter and Maslach (2001), depersonalization represents the interpersonal dimension of burnout. Symptoms of depersonalization include negative attitudes and callousness or excessive detachment toward other people or the job itself. This detachment is often coupled with a loss of idealism. Typically, depersonalization begins as a self-protective emotional distancing to buffer against the overload of emotional exhaustion (e.g., "clinical detachment" or "detached concern" among medical professionals). However, individuals experiencing burnout drift beyond professional detachment into dehumanization, becoming cynical and callous toward coworkers and clients (Leiter & Maslach, 2001; Maslach, Schaufeli, et al., 2001).

Professional inefficacy/diminished feelings of accomplishment. The self-evaluative component of burnout is represented by feelings of low self-efficacy at work. Individuals going through the stages of burnout often experience a progressive decline in their feelings of professional competence and productivity. In the early stages, people are more likely to experience a diminished sense of accomplishment but as burnout increases, they experience a growing sense of inadequacy or even failure. This sense of inefficacy has been linked with depression and perceptions of being

unable to cope with the demands of the job (Leiter & Maslach, 2001; Maslach, Schaufeli, et al., 2001).

Empirical evidence suggests that both personal and organizational factors influence the degree to which an individual will experience burnout\ (Ghorpade, Lackritz, & Singh, 2007; Hochwalder, 2006; Iverson, Olekalns, & Erwin, 1998; Langelaan, Bakker, van Doornen, & Schaufeli, 2006; Maslach, Schaufeli, et al., 2001; Mearns & Cain, 2003). Most of the research on hardiness has focused on identifying a combination of personal (e.g., hardiness) and organizational characteristics (e.g., supportive supervision) that may promote resilience among individuals working under relentlessly stressful conditions (e.g., nurses, teachers, police). Typically, the research designs employed facilitate within-study comparisons of the relative efficacy of different protective factors or the strength of the relationship between hardiness and burnout or its components, but cross-study comparisons are difficult because individual studies examine unique combinations of personal and environmental resources and constraints.

Further complications arise because some studies have reported correlations between the hardiness composite and each of the MBI components, some have reported correlations between the burnout composite and each of the hardiness components, and some have reported the correlations between hardiness and burnout composite scores. This state of affairs makes it difficult to generate a meaningful narrative integration of the research stream. Thus, a quantitative review is particularly

useful for studying the conceptually straightforward but logistically complex relationship between hardiness and burnout.

H_{1e}: Hardiness will be significantly negatively correlated with burnout.

Hardiness and Physical Health

Hardiness research began as an exploration of the relationship between several stress-related constructs and physical health (Kobasa, 1979a, 1979b). Over the years, while hardiness research expanded, many researchers continued to investigate the hardiness-health relationship (e.g., Bartone, Ursano, Wright, & Ingraham, 1989; Benisehk & Lopez, 1997; Epstein & Katz, 1992; Greene & Nowack, 1991; Heckman & Clay, 2005; Nowack & Hanson, 1983; Rich & Rich, 1987; Smith & Meyers, 1997; Williams & Lawler, 2003), but there has been limited theoretical work within the hardness literature to explain the specific mechanisms involved. However, Epel and colleagues have articulated a theory of psychological thriving that describes how the cumulative effects of cognitive appraisals in response to stressors can enhance or diminish physical health (Epel, McEwen, & Ickovics, 1998).

Physical Thriving in Response to Stress

According to Epel et al. (1998), individuals may "toughen up" after exposure to stressors if short term catabolic (destructive) processes are followed by greater anabolic (growth and renewal) processes. Catabolic processes are needed for energy mobilization during times of high demands (stressful encounters). Once the stressor is resolved, anabolic processes are activated, allowing for restoration and growth. This

process can be likened to muscle building where the muscle is exposed to stress, then allowed to rest and recover. During the period of stress, catabolic processes are dominant but during the rest period, anabolic processes take over. Assuming sufficient rest, the end result is a stronger, more resilient muscle. These authors propose a similar process for psychological thriving which can lead to physical thriving.

Epel and colleagues (1998) note that stress can serve as a catalyst for physical changes, advancing the physical system toward either greater resilience or disease. The trajectory depends on ingrained response patterns. A system with healthy responses will become more resilient whereas a weakened system will be unable to grow to accommodate the additional demands. The authors draw upon psychoneuroendocrine research to show that "certain styles of cognitive appraisal and perceptions of control can transform the effects of stress arousal from potentially damaging to health enhancing" (p. 302) through their effects on allostatic load.

Epel et al. (1998) conceptualize allostatic load as a preclinical disease process, which can lead to more serious disease outcomes. They define allostatic load as the physical damage that occurs when consistently high levels of stress hormones inhibit the body's ability to activate anabolic processes. Allostasis is related to the more familiar concept of homeostasis: the ability or tendency of an organism to adjust its physiological processes in order to maintain equilibrium. Allostasis describes the body's ability to adapt to a constantly changing environment. A "tight" allostatic system is able to move flexibly and fluidly between high and low levels of arousal in response to changing circumstances. However, when the body is in a constant state of

arousal (i.e., when stress hormones are slow to dissipate or stress is constant), the body is forced to carry a high allostatic load and physical damage is likely to occur. This damage leaves the body less able to respond flexibly to changes in the environment.

Epel et al. (1998) argue that psychological characteristics of the individual can influence allostatic load through the physiological consequences of cognitive appraisal processes: namely, challenge vs. threat appraisals as defined in the transactional model of stress (e.g., Larzarus & Folkman, 1984). The transactional model proposes that exposure to environmental demands (stressors) results in a two-stage cognitive appraisal process. During the first stage (the primary appraisal), the individual assesses whether the event is irrelevant (no consequences for personal well-being), benign-positive (potential for enhanced well-being), or stressful (harm/loss, threat, or challenge). Challenges represent environmental demands that provide an opportunity for growth or gain while threat appraisals are associated with the potential for harm or loss. During the second stage of the appraisal process (secondary appraisals), the individual assesses the match between coping resources available and the demands imposed by the stressor. If there are sufficient resources available, the demand will not be perceived as creating stress. Conversely, if the individual does not feel that the required resources are available, she/he will experience stress.

Challenge and threat appraisals are both associated with increased arousal, but research has shown that they elicit distinctly different physiological profiles (Blascovich & Mendes, 2000; Tomaka, Blascovich, Kelsey, & Leitten, 1993). Challenge appraisals are associated with increased cardiac reactivity and decreased

vascular resistance. That is, a more flexible cardiac response accompanied by decreased resistance in the blood vessels. In contrast, threat appraisals are associated with "defeated or threatened responses, higher reactive levels of cortisol, distress and potentially enhanced sympathetic activation" (Epel, McEwen, & Ickovics, 1998, pp. 311-312). Because inhibition of the parasympathetic system is expected to be associated with fewer catabolic (destructive) processes than excitation of the sympathetic system, challenge appraisals are expected to result in less wear and tear on the body.

The process described above is consistent with hardiness theory and findings from hardiness researchers. For example, Wiebe (1991) found evidence that hardy individuals tend to appraise the same objective stressor as less threatening. Her findings suggest that hardiness influences the appraisal of events, reducing their stressfulness and affective impact as well as altering their physiological consequences. Similarly, Florian et al. (1995) reported that hardy individuals seemed to be predisposed to appraise combat training in less threatening terms. Thus, hardy individuals may be less likely to develop pathological physical symptoms because their bodies are exposed to the physiologically stressful energy mobilization patterns associated with threat appraisals less often.

Measuring Health and Illness/Injury

The model proposed by Epel et al. (1998) provides a cogent explanation for how psychological constructs such as hardiness can influence physical health, but the question of how to measure constructs such as health and illness remains. Typically,

hardiness researchers have been more interested in the individual's experience of health or symptoms of illness than in the specific mechanisms involved. Thus, most hardiness researchers measure "health" in one of two ways: Some ask participants to provide global evaluations of their overall health, while others focus on experiences with illness or injury.

Global health evaluations vs. illness/injury. Within the hardiness literature, the most widely used general health assessment is the 36-item Medical Outcomes Study – Short Form (SF-36; Ware, Kosinski, & Keller, 1994). This paper-and-pencil self-report measure explores respondents' perceptions regarding their health in five areas: (1) limitations in physical activities because of health problems, (2) limitations in usual role activities because of physical health problems, (3) bodily pain, (4) vitality (energetic vs. fatigued, emotional distress vs. well-being), (5) general health perceptions. Other assessments within this category are similarly broad and invariably self-report.

Self-report vs. objective indicators. Researchers have employed a variety of methods for operationalizing "illness" (e.g., self-report symptom inventories, frequency of use of healthcare services, limited examination of medical records). Some researchers have voiced concerns about the equivalence of these methods. For instance, according to Orr and Westman (1990), research results have been more consistent when self-report data were used and Tartasky (1993) pointed out that underreporting of illness among hardy individuals could be a problem. Conversely, Wiebe and Williams (1992) noted that research by various authors has shown

neuroticism is positively related to subjective, but not objective health symptoms (Aronson, Barrett, & Quigley, 2006; Costa & McCrae, 1985, 1987; Rosmalen, Neelman, Gans, & de Jonge, 2007; Watson & Pennebaker, 1989). Because non-hardy individuals are likely to be higher in neuroticism, their levels of self-reported illness may be artificially inflated, thus increasing the size of the observed correlation between hardiness and illness.

H_{2a}: Hardiness will be significantly positively correlated with measures of physical health.

H_{2b}: Hardiness will be significantly negatively correlated with illness/injury.

H_{2c}: The mean correlation between hardiness and illness/injury will be stronger when self-report inventories are used relative to more objective measures.

Hardiness Components

Several researchers have noted that some hardiness components show stronger and more consistent relationships with a variety of hardiness correlates (e.g., Funk, 1992; Jennings & Staggers, 1994; Lachman, 1996; C. Lambert & Lambert, 1999; Lawler, Kline, Harriman, & Kelly, 1999; Orr & Westman, 1990; Ouellette, 1993; Steptoe, 1990; Wagnild & Young, 1991). The challenge component in particular has been criticized. Some authors have suggested that challenge should be dropped from the hardiness construct due to its comparatively low predictive power (Compton, Seeman, & Norris, 1991; Cox & Ferguson, 1991; Funk & Houston, 1987; Hull, Van Treuren, & Virnelli, 1987), while others have noted that the strength of the

component-outcome relationships may vary between components and across different types of outcomes (Blaney & Ganellen, 1990; Lachman, 1996; Taylor & Aspinwall, 1996). Tartasky (1993) has noted that challenge has shown limited explanatory power in predicting health outcomes but Orr and Westman pointed out that the original operationalization of challenge was inadequate. They argue that challenge is a critical component of the hardiness construct and they suggest that decisions about its inclusion or exclusion should be based upon evidence gathered using better measurement tools.

Viewed from a systems science perspective, Orr and Westman's argument has considerable merit. Hardiness theory specifically assumes synergistic relationships between the three components. In other words, hardiness is viewed as a system with emergent properties (i.e., when all three components work in combination, the individual will display characteristics that cannot be attributed to any one of the components). Removing a critical component from a system frequently results in unexpected consequences. Reconceptualizing hardiness as a system containing just commitment and control has important theoretical consequences that have yet to be addressed. Therefore, I am unable to endorse the removal of the challenge component in the absence of clear and compelling evidence (such as a non-significant mean correlation between challenge and multiple indices of health and well-being).

Although challenge has attracted the most attention, reviewers have also commented upon differential contributions of other components. For example, Hull et al. (1987) and Orr and Westman (1990) both remarked that commitment has shown

the most consistent performance across studies. According to Lachman (1996), commitment has emerged as a noticeably better predictor of burnout than the other two components. C. Lambert and Lambert (1999) commented that some studies find only one or two dimensions are predictive of outcomes of interest. They also note that different dimensions are predictive in different studies.

Although the design of this study does not allow for testing the underlying structure of the hardiness construct, it provides an opportunity to more systematically explore the strength and consistency of the relationships between hardiness components and correlates of interest from multiple domains. Most recommendations for dropping the challenge component and other suppositions regarding the relative contributions of components have been based on a comparatively small collection of studies that used earlier measures of hardiness. In contrast, for this study, I was able to obtain estimates of the strength and consistency of each hardiness component with correlates from six different content domains with a larger, more representative sample of studies.

H_{5a}: All three hardiness components (commitment, control, and challenge) will be significantly positively correlated with subjective well being.

H_{5b}: All three hardiness components will be significantly negatively correlated with psychological distress.

H_{5c}: All three hardiness components will be significantly positively correlated with job satisfaction.

H_{5d}: All three hardiness components will be significantly negatively correlated with burnout.

H_{5e}: All three hardiness components will be significantly positively correlated with physical health.

H_{5f}: All three hardiness components will be significantly negatively correlated with illness/injury.

Core Theme 2: Instrumentation as a Potential Moderator

Many authors have commented on measurement issues within the hardiness literature. The most commonly-cited problems concern differences in the level of psychometric and theoretical soundness of various instruments (e.g., Funk, 1992; Funk & Houston, 1987; Hull, Van Treuren, & Propsom, 1988; Orr & Westman, 1990; Ouellette, 1993; Parkes & Rendall, 1988; Tartasky, 1993; Younkin & Betz, 1996). Early hardiness instruments used pre-existing scales designed to measure different constructs and relied exclusively on negative indicators to assess hardiness (e.g., a tendency to endorse alienation items would be assumed to indicate low levels of commitment). In contrast, later versions were specifically designed to measure hardiness and used a combination of negative and positive items. Thus, different patterns of relationships may be observed. Specifically, because the more recent hardiness instruments are conceptually clearer, they may show stronger relationships between hardiness its correlates.

Generations of Hardiness Instruments

Hardiness researchers typically distinguish between four different "generations" of hardiness instruments. The original hardiness measure represents the first generation and came out of the Illinois Bell studies. Early in that project, a large group of executives completed an extensive battery of psychological tests containing 19 different scales or instruments. Of those 19 tests, 12 distinguished between high and low illness groups in a discriminant function analysis Kobasa, 1979a, 1979b). Those 12 scales became the original Hardiness Scale, which later came to be known as the first generation of hardiness measure.

As hardiness theory progressed, three second generation instruments were developed. The most widely used second generation measure was the Unabridged Hardiness scale (UHS), which retained six of the scales from the first instrument: (a) The alienation from self and from work scales from the Alienation Test (Maddi, Kobasa, & Hoover, 1979) were used to measure commitment, (b) the Powerlessness Scale (Maddi, Kobasa, & Hoover, 1979) and the External Locus of Control Scale (Rotter, Seeman, & Liverant, 1962) were used to measure control, and (c) the Security Scale (Hahn, 1966) and the Cognitive Structure Scale (Jackson, 1974) were used to assess Challenge. However, the Cognitive Structure Scale did not appear to consistently measure the intended construct and was dropped from later versions (Kobasa, 1982; Kobasa, Maddi, & Kahn, 1982). In addition, two shortened versions of the UHS were introduced: the 36-item Revised Hardiness Scale (RHS; Kobasa,

Maddi, & Courington, 1981) and the 20-item Abridged Hardiness Scale (AHS; Kobasa & Maddi, 1982; McNeil, Kozma, & Hannah, 1986).

In time, many authors (including Maddi and Kobasa) expressed concerns with the first and second generation instruments. These measures relied exclusively on negative indicators and they used pre-existing scales to assess hardiness. A third generation of hardiness instruments was developed to address these concerns: the Personal Views Survey (Hardiness Institute, 1985) and the Dispositional Resilience Scale (Bartone, Ursano, Wright, & Ingraham, 1989). As Funk (1992) has commented, these two instruments share the same format and the item content is quite similar. Unlike earlier generations of hardiness instruments, these measures were specifically designed to assess the hardiness components as defined by hardiness theory. These instruments also incorporated items assessing both the positive and negative poles of each component. For example, some of the items assessing control asked about attitudes suggesting an internal locus of control (e.g., "What happens to me tomorrow depends on what I do today"; DRS, Bartone, et al., 1989) while others measured powerlessness (e.g., "I can't do much to prevent it if someone wants to harm me"; DRS, Bartone, et al., 1989).

Using a slightly different conceptual model, Nowack (1985) developed an alternative instrument called the Cognitive Hardiness Scale (CHS). The CHS was constructed from previously validated scales, although Nowack has stated that careful attention was given to addressing criticisms raised about the second generation instruments. Commitment was assessed through the Alienation from Work Scale

(Maddi, Kobasa, & Hoover, 1979), the Locus of Control Scale (Rotter, Seeman, & Liverant, 1962) was employed to measure control, and challenge was assessed with the Sensation Seeking Scale (Zuckerman & Link, 1968). Thus, the CHS uses more narrowly focused definitions for each of the components. The sense of alienation from work (rather than self or family) is more strongly emphasized, the control component assesses perceived ability to influence important outcomes but does not measure the perceptions of coping efficacy, and the challenge component focuses on seeking out novelty, change, and intense experiences in order to live life to its fullest rather than on personal growth.

The third generation of hardiness measures represented a significant improvement, but soon another set of concerns arose. Although the PVS and the DRS both incorporated a mixture of positive and negative indicators, negative indicators still outnumbered the positive indicators by at least 2:1. While some researchers felt that the third generation of hardiness instruments had adequately addressed psychometric shortcomings of the second generation instruments (e.g., Maddi, 1998; Orr & Westman, 1990), others continued to express reservations (e.g., Funk, 1992; Ouellette, 1993). Parkes and Rendall (1988) noted that a preponderance of negatively keyed items might increase the overlap between hardiness and neuroticism. Findings from Sinclair and Tetrick (2000), and Chan (2003) suggested that their concern was justified.

Sinclair and Tetrick (2000) examined the underlying structure of the hardiness construct. They found that positively and negatively worded items measured different

aspects of the hardiness domain. More specifically, their results showed that positively worded items predicted different types of health and performance outcomes than negatively worded items. They also noted that positively worded items appear to be structurally distinct from neuroticism while negatively worded items were less clearly differentiated. Similarly, results of a study by Chan (2003) indicated that (a) a six-factor solution provided the best fit with the data in a confirmatory factor analyses, and (b) positive and negative dimensions of hardiness predicted different outcomes. These findings illustrate the need for researchers to measure both positive and negative aspects of hardiness. Some researchers have responded by creating new versions of the PVS and DRS that provide a balance of positive and negative items while Sinclair, Oliver, Ippolito, and Ascalon (2003) developed a six dimension hardiness instrument designed to measure both positive and negative facets of each of the hardiness components. Collectively, these instruments are referred to as fourth generation instruments.

Examining the Effects of Instrumentation in a Meta-Analysis

Several authors have pointed out the difficulties comparing the effects of hardiness across studies employing different measures – at least in the context of qualitative reviews (Funk, 1992; Funk & Houston, 1987; Hull Van Treuren, & Virnelli, 1987; C. Lambert & Lambert, 1999; V. Lambert & Lambert, 1987; Orr & Westman, 1990; Younkin & Betz, 1996). While quantitative integration techniques are much more suitable for addressing this issue, there are still limitations. Meta-analyses

can only be conducted on studies that include the same variables. One of the challenges when conducting a meta-analysis is defining what constitutes "the same" (i.e., determining which operational definitions of a particular variable should be considered equivalent). In the context of examining instrumentation as a potential moderator, it is necessary to decide which instruments (if any) should be grouped together into a single category.

At first glance, it might seem logical to group together only studies that employ the same measure of hardiness when examining instrumentation as a potential moderator. However, examination of the available data suggests that this approach is neither feasible nor desirable. Although the hardiness literature is extensive and I have aggregated hardiness correlates into relatively broad categories, there are still many cases where very few studies have examined a particular correlate using the same instrument. Thus, most of the analyses would contain a minimal number of studies.

More importantly, this approach would generate an unmanageable amount of data. There are six major hardiness instruments and a number of "eclectic" instruments (e.g., studies that have modified existing hardiness instruments or designed their own measures based on hardiness theory). To complicate things further, there are multiple versions of the third/fourth generation instruments. The Dispositional Resilience Scale has 45-, 30-, and 15-item versions while there are four versions of the Personal Views Survey (the PVS, the PVS-II, the PVS-III, and the PVS-IIIR). Given this plethora of potential categories, it is clearly necessary to develop some theoretically defensible method of aggregation. Fortunately, the generations of hardiness measures represent a

widely accepted taxonomy which can be used to organize the literature by grouping instruments containing similar content into larger categories.

To test hardiness instrumentation as a moderator, I assigned each instrument to one of these categories: Second generation instruments (UHS, RHS, AHS), third generation instruments (DRS, PVS, PVS-II), fourth generation instruments (DRS-II, PVS-III, PVS-IIIR), the Cognitive Hardiness Scale (CHS), and eclectic/study specific instruments. These categories were based on conceptual similarities and shared strengths and weaknesses. That is, second generation instruments used pre-existing scales and negatively keyed items. Third generation instruments were specifically designed to measure the hardiness construct and incorporate some positively keyed items, while the fourth generation instruments contain a balance of positive and negative indicators for each component. The CHS was assigned to its own category because it equates challenge with novelty/sensation-seeking (Nowack, 1990) whereas Kobasa and Maddi conceptualize challenge as the ability to tolerate uncertainty in the pursuit of personal growth (Kobasa, 1982; Maddi, 2002). Although Nowack's measure is typically classified as a third generation instrument, the conceptualization of challenge for this measure is narrower and more biologically-based than in other third generation instruments. Thus, it is unclear whether there is sufficient similarity to justify combining it with other hardiness instruments. The fifth category contains a miscellaneous collection of eclectic instruments that follow the conceptual model closely enough to be considered hardiness instruments but have not been adequately validated. Studies using the first generation Hardiness Scale will not be included in

this meta-analysis because all studies employing that measure were based upon a single sample (the Illinois Bell executives).

Since first and second generation instruments rely on negative indicators, there may be more conceptual overlap with neuroticism (cf., Orr & Westman, 1990; Ouellette, 1993). This could result in stronger relationships being observed with negative correlates (i.e., psychological distress, burnout, neuroticism/NA, somatic symptoms/illness) in studies employing older measures. The CHS conceptualizes hardiness slightly differently than other third generation instruments. Therefore, a different pattern of relationships between hardiness and outcomes may emerge when this scale is used.

H_{3a}: Third and fourth generation instruments will show a stronger relationship with subjective well-being than second generation instruments.

H_{3b}: Second generation instruments will show stronger relationships with psychological distress than third and fourth generation instruments.

H_{3c}: Third and fourth generation instruments will show a stronger relationship with job satisfaction than second generation instruments.

H_{3d}: Second generation instruments will show stronger hardiness-burnout relationships than third and fourth generation instruments.

H_{4a}: Second generation instruments will show stronger hardiness-illness/injury relationships than third and fourth generation instruments.

H_{4b}: The average correlation between hardiness and illness/injury symptoms will be strongest among studies employing self-report instruments.

METHOD

Literature Search

I obtained studies pertaining to hardiness and health or well-being through several different channels. I began by conducting a comprehensive literature search, which was accomplished in two stages. First, I searched the PsycINFO database to identify appropriate publications and dissertations through November 2008. Search terms included *hardiness*, *resilience, ego-strength*, and *sense of coherence*[1]. Examination of abstracts revealed that only the *hardiness* search term produced studies that examined the hardiness meta-construct. Thus, in my subsequent search of nine other databases employing the EBSCO Host service, I used only the *hardiness* keyword. The following databases were included in the second search: Academic Search Premier, Business Source Premier, ERIC, Health Source: Nursing/Academic Edition, MasterFILE Premier, MEDLINE, Military and Government Collection, Psychology and Behavioral Sciences Collection, and SocINDEX. It should be noted that the ERIC database includes papers and presentations from conferences for the American Psychological Association (APA) and regional divisions and the APA. Database searches were supplemented with requests for unpublished studies sent to the Hardiness Institute as well as the listserves for the Society of Personality and Social Psychology and the Society for Occupational Health Psychology.

[1] The keyword index of PsycINFO lists resilience as a synonym for hardiness. Other possible synonyms came from the literature.

Selection of an Effect Size Metric

Meta-analysis techniques can be applied to a number of different types of effect sizes (e.g., mean differences between experimental and control groups, odds ratios, chi-square tests, correlations). For this study, I selected the correlation coefficient as the effect size of interest. This decision was based on both pragmatic and conceptual concerns. Pragmatically, using correlations (or statistics that could be converted to the correlation metric) allowed for inclusion of the largest and most varied selection of studies. Conceptually, correlations provided the closest match with the goals of this study, as I am primarily interested in examining the *patterns* of relationships (i.e., degree of covariation) between hardiness and various indicators of health and well-being (i.e., similarities and differences in the strength of the relationships within and across categories of correlates) rather than examining mean differences between groups (e.g., mean hardiness scores among military samples relative to healthcare workers).

Inclusion Criteria

Studies included in the meta-analyses had to fit three major inclusion criteria. First, the study must include a measure of hardiness consistent with hardiness theory (i.e., commitment, control, and challenge were assessed). Studies that reported only a single composite score were retained, providing that all three components were represented in the instrument used to measure hardiness. However, studies that examined other stress-resilience constructs or included only one or two of the

components were excluded. Studies examining domain or role specific forms of hardiness (i.e., health-related hardiness, academic hardiness, or family hardiness) were also excluded because (a) the definitions of what constitutes a hardy individual differ for each "form" of hardiness and (b) the bandwidth (i.e., the breadth of the concept being measured) varied across hardiness forms. Second, the study needed to include a measure for at least one of the following: SWB, psychological distress, job satisfaction, burnout, global health perceptions, or illness/injury (operational definitions for each of these constructs are supplied in the coding section). Third, to be included, the study must provide information that would allow a correlation coefficient to be determined for the relationship between hardiness and one of the six correlates selected for this study. Table 1 shows the number of studies conducted each year as a percentage of the total and Table 2 summarizes the number of studies and the cumulative *N* available for the meta-analysis for each of the six correlates.

Table 1
Number of Hardiness Studies Conducted Each Year

Year	No. of Studies	% of Total	Cumulative %
1983	2	1.0	1.0
1985	2	1.0	2.0
1986	7	3.5	5.5
1987	12	6.0	11.6
1988	8	4.0	15.6
1989	10	5.0	20.6
1990	11	5.5	26.1
1991	9	4.5	30.7
1992	8	4.0	34.7
1993	8	4.0	38.7
1994	8	4.0	42.7
1995	8	4.0	46.7
1996	8	4.0	50.8
1997	11	5.5	56.3
1998	9	4.5	60.8
1999	17	8.5	69.3
2000	12	6.0	75.4
2001	12	6.0	81.4
2002	10	5.0	86.4
2003	7	3.5	89.9
2004	5	2.5	92.5
2005	6	3.0	95.5
2006	4	2.0	97.5
2007	2	1.0	98.5
2008	2	1.0	99.5
No Date	1	0.5	100

Table 2
Number of Studies and Cumulative Sample Size by Correlate

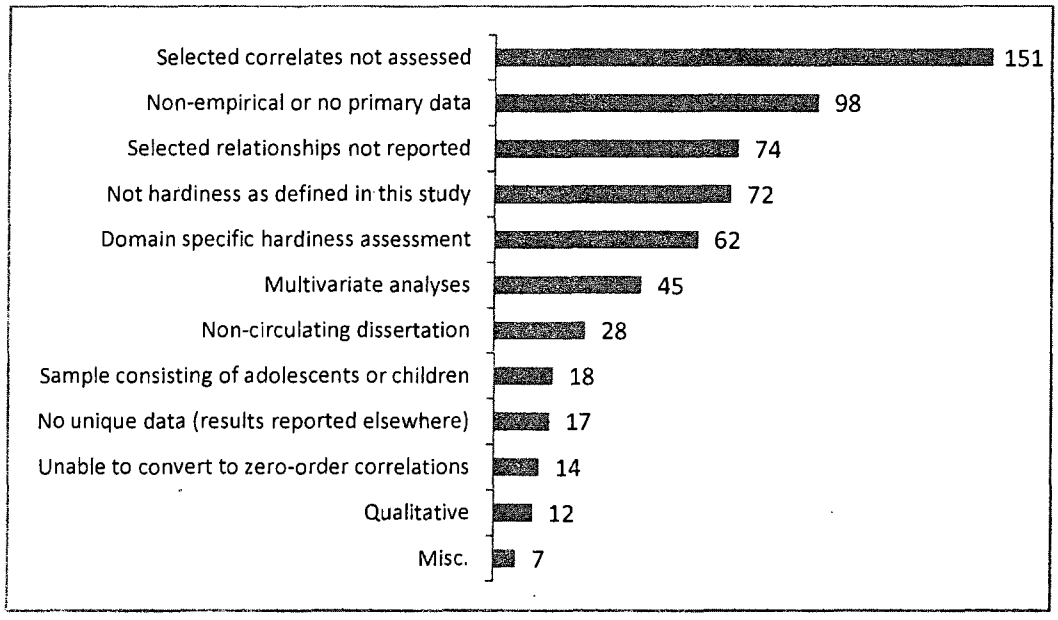
	Hardiness Composite Assessed		Hardiness Components Assessed	
	Number of Studies (*K*)	Total *N*	Number of Studies (*K*)	Total *N*
Subjective Well-being	31	5,745	13	3,233
Psychological Distress	94	20,469	50	12,119
Job satisfaction	18	6,273	8	3,169
Burnout	44	9,289	24	3,996
Physical Health	18	3,527	8	1,859
Illness/Injury	54	12,336	20	3,863

Excluded Studies

I evaluated 798 documents (journal articles, book chapters, conference presentations, dissertations, unpublished manuscripts and reports) as potential sources of data. A total of 597 documents failed to meet at least one of the inclusion criteria. As shown in Figure 1, the largest exclusion category ($k = 151$) was comprised of studies that did not assess any of the six correlates chosen for this meta-analysis while the second largest category ($k = 98$) consisted of documents that did not report primary data such as non-empirical materials (e.g., theoretical articles, literature reviews) and the meta-analysis conducted by Mills (2000). The category labeled "selected relationships not reported" included studies that assessed both hardiness and at least one health or well-being variable, but did not report the relationship between the two ($k = 74$). A substantial number of "hardiness" studies ($k = 72$) employed assessments that were not consistent with hardiness theory. For example, combining resilience-

related constructs such as self-esteem and locus of control to create an index of "hardiness" or using a single hardiness component (or facet of a component) to represent the hardiness construct (e.g., powerlessness or commitment). A sizeable number of hardiness studies ($k = 62$) employed domain specific measures of hardiness (e.g., academic hardiness, health related hardiness, family hardiness). A total of 45 of studies were excluded because only multivariate methods such as factor analysis, multiple regression, or structural equation modeling were used for hardiness-related analyses, another 14 were excluded because not enough information was reported to allow correlation coefficients to be calculated, and 28 non-circulating dissertations were excluded. Other studies were excluded because the samples included children or adolescents ($k = 18$), because all of the data relevant to this meta-analysis was reported through another source (e.g., study results reported in a dissertation and a publication or multiple publications arose from a single study and none of the hardiness data reported was unique; $k = 17$), or because qualitative methods were used ($k = 12$). Finally, 7 studies were excluded for one of the following reasons: tables were illegible or unintelligible, descriptions of outcome measures were insufficient to allow for coding, the study was not available in English, or hardiness was measured with a first generation instrument.

Figure 2. Summary tallies for excluded sources



Coding

Following the exclusion of those studies which failed to meet the inclusion criteria, a total of 200 distinct samples remained, representing a cumulative *N* of 46,383. The following information was recorded for each study: (1) year of the study, (2) sample size, (3) correlation coefficient for each relationship (including direction), (4) category (e.g., psychological distress) and subcategory (e.g., depression) represented in the effect size, (5) specification of hardiness component represented in the relationship (i.e., commitment, control, challenge, composite) for each effect reported, (6) generation of hardiness measure employed in the study (e.g., second generation, third/fourth generation, CHS), (7) names and/or descriptions of instruments used to assess hardiness correlates (i.e., SWB, psychological distress, job

satisfaction, burnout, health, and illness/injury), (8) gender mix within the sample (percentage female), and sample type (e.g., student, healthcare workers, managers/professionals, older adults, medical samples). Operational definitions for each correlate category and subcategory are provided below. Table A1 in the Appendix provides descriptive information for each of the studies included in the meta-analysis.

To increase coding reliability, each study was independently coded by myself and one of two clinical psychology graduate students (each coding half of the studies). Initial Kappas (prior to discussion) ranged from .68 to 1.00, indicating adequate to excellent agreement.[2] All discrepancies were discussed to consensus.

Psychological Correlate Categories: Well-being and Distress

Subjective well-being. This category included constructs identified by Diener (1984) as measures of general well-being such as quality of life, life satisfaction, happiness, or the preponderance of positive over negative affect. Subcategories included cognitive well-being (evaluations of overall satisfaction), affective well-being (proportion of positive to negative affect), or combination measures (both cognitive and affective aspects of well-being assessed).

Psychological distress. This category consisted of assessments of distress that were consistent with one or more of the syndromes described in the tripartite model

[2] Although there are no universally accepted guidelines for interpreting Kappa, Landis and Koch (1977) have proposed the following commonly cited standards for classifying strength of agreement: 0 = poor (no better than chance), 01-.20 = slight, .21 to .40 = fair, .41 to .61 = moderate, .61 to .80 = substantial, .81 to 1.00 = almost perfect.

(e.g., depression, hopelessness, anxiety, negative affect). Subcategories included depression, anxiety, and general distress. Instruments such as the Brief Symptom Inventory or the General Health Questionnaire which provide global assessments of distress across multiple dimensions (e.g., depression, anxiety, and somatic symptoms) were classified as measures of general distress.

Job satisfaction. This category included assessments of satisfaction in the work domain that are consonant with Hulin and Judge's (2003) definition of job satisfaction. That is, assessments focusing on individuals' cognitive/evaluative, affective, and behavioral responses to their jobs (e.g., Job Descriptive Index, Job Satisfaction subscale of the Work Stress Questionnaire).

Burnout. Measures assessing either the combination of emotional exhaustion, depersonalization, and diminished feelings of personal accomplishment (Maslach Burnout Inventory) or feelings of emotional, physical, and mental depletion (Staff Burnout Scale for Health Professionals, Tedium Burnout Measure) were included in the burnout category. Only burnout composite scores were analyzed in this review. When necessary, burnout composite scores were calculated.

Physical Health Correlates:

Perceived physical health. Instruments assessing overall perceptions of health as measured by instruments such as the Short Form Health Assessment (SF-36), the Self-Health Assessment, the Health Perceptions Scale, and single item or multi-item assessments of global health perceptions developed for individual studies were included in the physical health category.

Illness/injury. Measures assessing medical, physical, or somatic symptoms assessed through instruments such as the Cohen-Hoberman Inventory of Physical Symptoms, medical conditions and physical symptoms subscales from the Health and Daily Living Form, the Health Problems Questionnaire, the Recent Physical Symptoms Checklist, the Seriousness of Illness Rating Scale, self-reported experience of medical problems, number of visits to healthcare providers, or self-reports of health problems such as number of days ill, and number of major or minor illnesses or hospitalizations within the past one to three years were included in the illness/injury category.

Medical vs. Somatic Conditions

One of the distinctions sometimes made in examining the relationship between psychological constructs and symptoms of illness is "somatic" vs. "medical" symptoms. Somatic assessments such as the Pennebaker Inventory of Limbic Languidness (PILL; 1982) focus on physical symptoms that often have a connection with psychological processes. Therefore, studies that rely exclusively on somatic assessments may show a stronger relationship with psychological constructs such as hardiness than studies using instruments that include a wider variety of ailments. Some examples of somatic symptoms include racing heart, sweating and trembling, dizziness, asthma, nosebleeds, chest pains, indigestion, rashes, headaches, colds and flus. Many measures of psychological distress measures such as the Symptoms Checklist-90 (SCL-90; Derogatis & Cleary, 1977) or the Hopkins Symptom Checklist

(HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) also provide subscales to assess somatic symptoms (i.e., physical symptoms with a psychological origin).[3]

Medical assessments focus primarily on symptoms that are less likely to be influenced by the stress response process. For example, the Seriousness of Illness Scale (Wyler, Masuda, & Holmes, 1968), which is the most widely used illness assessment used in the hardiness literature, provides a list of 126 ailments covering a wide range of severity levels. The list was compiled based on data gathered from hospital and clinic settings, supplemented with diagnoses from medical reference books concerned with internal medicine and disease. Examples of conditions ranked as least serious include warts, cold sores, and corns while ailments such stroke, heart attack, and leukemia were ranked as some of the most serious conditions. It should be noted that several conditions are typically included in both types of assessments (e.g., headaches, indigestion, dizziness, fainting, colds and flus).

Sample Categories

Coding for sample categories in this study included: students, working adults (misc.), managers and professionals, blue collar workers, white collar workers, military personnel, healthcare workers, human services workers (e.g., clergy, clinical psychologists, social workers), teachers, community samples, older adults, athletes, and medical samples. When analyzing the data, it was necessary to aggregate various subcategories into larger categories, depending on data available for a particular

[3] Contrary to common usage in lay language, these symptoms are neither imaginary nor inconsequential.

correlate. As a result, analyses for each correlate included a different combination of sample types. The primary categories are described below. Specific sample categories employed for each analysis are described in the results section.

Students. This category consisted of college students at any phase of training, ranging from freshman to graduate students.

Working adults. Samples were classified as consisting of working adults when more detailed occupational information was not available. Examples include studies where data was collected from members at all levels of a large organization (e.g., university employees ranging from janitors to deans) or when working full time was a requirement for eligibility and more descriptive information that could be used to group the sample with other, similar samples was not available (e.g., single mothers who had recently transitioned from welfare to work). Whenever possible, more detailed information about occupation was recorded and retained (e.g., managers and professionals, healthcare workers, teachers, human service workers, blue collar workers, military personnel). However, in most cases it was necessary to aggregate various occupations into a working adult category to form groups sufficiently large to allow for statistical analyses.

Older adults. Samples consisting entirely of individuals over the age of 60 were classified as older adults.

Medical samples. This category consists of samples recruited through medical providers or based on the presence of specific medical conditions (e.g., HIV+, rheumatoid arthritis, diabetes).

Community samples. This rather diverse category consists of samples that were either recruited from the community (e.g., residents of Orange County, women who attended a particular college within a specific 5 year period, individuals enrolled in an aerobics class), athletes, and samples that incorporated a mixture of students and working adults.

Meta-Analytic Procedures

As noted previously, I employed the correlation coefficient as the measure of effect size for this study. I used conventional model-based meta-analytic techniques to test effect size centrality, homogeneity, and moderation (Hedges & Olkin, 1985; Lipsey & Wilson, 2001). Following generally recommended practices (e.g., Hedges & Olkin, 1985; Lipsey & Wilson, 2001; Rosenthal, 1991), I applied Fisher's z_r transformation to all correlation coefficients used as data. This transformation normalizes the sampling distribution of r and stabilizes the variance. Each transformed correlation coefficient was weighted by its inverse variance weight (i.e., the inverse of the asymptotic sampling variance),[4] thereby giving greater weight to effect sizes with less sampling error. The Fisher correlations were transformed back into the correlation metric for presentation of the results.

A separate meta-analysis was conducted for each correlate. Significant heterogeneity tests were followed by moderation testing for generation of hardiness instrument, within-category variables identified in the introduction as potential

[4] Formula under the fixed effects model = $z_r * (N - 3)$. Fixed and random effects models are explained in the next section.

moderators, sample characteristics, and publication status (published vs. non-published). Significant moderation tests were followed up with post hoc tests to determine which subgroups showed significantly different means. Finally, I analyzed the relationships displayed by each component and the composite score with each of the health and well-being correlates included in this study. In cases where hardiness or burnout components (but not composites) were reported, composite variables were calculated following recommendations provided by Hunter and Schmidt (2004).

Model Selection: Fixed vs. Random Effects

There are two types of statistical models available for meta-analysis: fixed- and random-effects models. As described below, each model represents a different set of assumptions, which allow researchers to make different kinds of inferences. The fixed effects model provides more precise estimates, but it is more restrictive in terms of the generalizability of the inferences that can be made. For this study, I employed a "conditionally random-effects procedure" as described in Hedges and Vevea (1998). The conditionally random-effects procedure utilizes the results of the homogeneity test to inform model selection. If homogeneity tests are non-significant (i.e., variability is low), the fixed-effects model is preferred. (When moderators are hypothesized, additional analyses testing the subgroups are performed under the fixed effects model.) If results suggest the presence of study-level sampling error, the random effects model is applied. Evidence of study-level sampling error include: (a) significant heterogeneity tests in the absence of hypothesized moderators, or (b)

significant within groups Q-test results when moderators are tested. These procedures are described in more detail in the following sections.

Homogeneity Testing

Homogeneity analyses test whether it is reasonable to assume that all of the correlations included in the sample are estimating the same population mean effect size (i.e., does the sample represent a single population, or was the sample drawn from multiple populations?) In this study, analysis of variance (ANOVA) analog Q-tests were employed to evaluate effect size homogeneity. A significant homogeneity test suggests that the distribution of effect sizes is heterogeneous. Thus, subsamples representing different populations need to be separately analyzed or the random effects model should be employed (or both). Conversely, a non-significant Q-test suggests that the mean effect size is a reasonably good descriptor for the population and additional analyses are not required.

When homogeneity test results suggested that moderators might be present (i.e., when test results indicated there was more heterogeneity in effect sizes than could be accounted for by sampling error alone), I tested several potential moderators, beginning with instrumentation. More specifically, I divided studies by generation of hardiness instrument for the first test of moderation. In the second round of moderation tests, I divided studies by type of assessment employed to measure SWB (cognitive, affective, or combination), psychological distress (depression, anxiety, general distress), burnout instrument (MBI, TBM, SBS-HP), illness/injury (somatic vs. medical ailments), and reporting source (self-report vs. more objective indicators).

I also conducted exploratory analyses to determine whether other study level variables, including gender, sample characteristics/occupational classification (e.g., students, older adults, and medical samples or human services workers, teachers, and military personnel), and publication status (published vs. unpublished) were associated with different effect sizes.

Fixed Effects Models

The assumption of homogeneity of effect sizes represents a key difference between the fixed effect model and the random and mixed effects models.[5] This assumption influences the inverse variance weight which is used in calculating the standard error, which is in turn used in calculations of mean effect sizes and confidence intervals.[6] The fixed effects model assumes that one of three conditions has been met: (a) the entire population of studies is represented in the data set, (b) the sample of studies included in the data set are sufficiently representative of the population of studies to reduce sampling error to negligible levels, or (c) all of the study-level variability can be attributed to specific characteristics of the studies that can be identified (moderator variables). In contrast, random/mixed effects models employ different assumptions, which are described later.

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[5] Mixed effects models represent a specific category of random effects models.

[6] Procedures for manually calculating the mean effect size, 95% confidence intervals, and homogeneity tests under the fixed and random effects models are shown in the Appendix. Mixed models do not lend themselves to manual calculation because they require matrix algebra to estimate the random variance component. Lipsey and Wilson (2001) recommend Kalaian and Radenbush (1996), Overton (1998), and Raudenbush (1994) for more specific information.

When computing mean effect sizes under the fixed effects model, each study is weighted by a term intended to represent the differential precision of statistical estimates of population values. Since larger sample sizes provide more precise estimates (i.e., there is less subject-level sampling error), studies employing larger samples are given more weight. If effect sizes are not homogeneous (i.e., variability in observed effects sizes is too great to be attributed to subject-level sampling error alone), the Type I error rate will be inflated unless the weighting variable is recalculated (i.e., a random or mixed effects model is used).

Obtaining significant results for both within- and between-groups testing under the fixed effects model presents researchers with a challenge. Ideally, either additional moderators can be identified or categories with smaller *k* can be combined to increase sample size and allow for calculation of a more precise estimate, so that the fixed effects model can be used without violating its assumptions. Neither of these solutions proved feasible in this study. In each case, combining categories was either infeasible (e.g., only two categories existed) or undesirable (e.g., aggregation resulted in very diverse groups being combined, defeating the purpose of the moderation test). Testing for additional moderators previously identified in the hardiness literature (sample type and gender) also produced significant within-group Q-test results and large I^2 values under the fixed effects model. Testing for multiple moderators was not feasible as there were few studies meeting multiple moderation criteria. Similarly, testing other moderators suggested in the literature (e.g., ethnicity, education, socioeconomic status) proved impractical because few studies provided sufficient information about

these variables. Thus, I used the random effects model to calculate marginal (correlate level) effect sizes and the mixed effects model for all moderation tests in this study. The assumptions behind these models are explained in the next section.

Random and Mixed Effects Models

Random effects models assume that the observed variability in effect sizes represent a combination of subject-level sampling error and variability in the population of effects whose source cannot be identified. Thus, a random effects model incorporates an additional variance component into the statistical model, recalculating the inverse variance weight associated with each study to accommodate study-level sampling error in addition to subject-level sampling error. Study-level sampling error is expected to be present when the studies in the meta-analysis represent a sample from a population of studies.

Distinctions are sometimes made between the "pure" random effects model and the mixed effects model. The random effects model assumes that all variability beyond subject-level sampling error is randomly distributed whereas the mixed effects model assumes that variance beyond subject-level sampling error has both systematic and random components (e.g., moderator variables combined with random differences between studies that are associated with variations in procedures and settings). The mixed effects model shares characteristics with both the fixed and random effects models. Similar to the fixed effects model, studies are grouped according to their status on study-level moderator variables. Then the inverse variance weight is recalculated to incorporate the additional study-level random variance component.

Hunter and Schmidt Adjustments

Hunter and Schmidt have proposed an extensive set of adjustments that can be applied in meta-analyses in addition to the Fisher transformation. They have identified nine sources of artifactual variance across studies and proposed adjustments for each (Hunter & Schmidt, 1994, 2004). These include unreliability in the independent and dependent variables, artificial dichotomization of continuous variables, range restriction, bias in the correlation coefficient, study-caused variation (e.g., concurrent validation studies, reporting of partial rather than zero-order correlations), and imperfect construct validity. Hunter and Schmidt suggest that failure to correct for these artificial sources of variance can make the data less informative. However, DeShon (2003) has raised some concerns regarding application of the Hunter and Schmidt adjustments. He points out that "the corrections for measurement error in the VG model [the validity generalization model used by Hunter and Schmidt] is extraordinarily difficult and fraught with numerous inferential hazards." DeShon goes on to describe results from generalizability research which suggest that applying artifact corrections can lead to incorrect conclusions about population effect sizes and the variability in those effect sizes. Therefore, the Hunter and Schmidt adjustments were not applied.

RESULTS

In the following sections, I describe meta-analytic results for the marginal effect size distributions pertaining to the relationship between hardiness and correlates relating to positive and negative dimensions of health and well-being.[7] This includes weighted mean effect sizes for each correlate as well as heterogeneity test results. I go on to describe the results of a series of analyses exploring variables that could moderate effect size distributions through instrumentation effects (i.e., generation of hardiness measure or underlying conceptual model employed in the other correlates), gender, characteristics of the samples (e.g., students, working adults, and medical samples) or publication status.[8] Publication status was included as a potential moderator because published studies are much easier to identify and acquire, so they are likely to be more comprehensively represented in the data set. However, if published studies show systematically larger effect sizes than unpublished studies, they will not accurately represent the population of studies on the topic of interest. Thus, it is important to test whether there are systematic differences in the observed effect sizes of published and unpublished studies.

Prior to calculating mean effect sizes, scatterplot and box plot diagrams for the observed correlations between hardiness and each of the health and well-being correlates were examined. Upon inspection, none of these graphs revealed any

[7] Alpha was set to .05 to define statistical significance for all analyses.

[8] Gender and sample moderators were added as exploratory analyses. They were initially excluded due to difficulties in creating representative subgroups. However, when the first set of moderators tested failed to produce homogeneous subgroups, these analyses were examined as potential sources of systematic variance.

extreme outliers or the composite-correlate relationships, although one study showed an unusually small effect size for the relationship between hardiness and burnout while two studies showed relatively large effect sizes for the hardiness-illness/injury relationship. When the component-correlate dispersion graphs were examined, boxplot graphs suggested unusual values for the following: commitment-SWB, commitment-distress, commitment-illness/injury, and challenge-illness/injury. However, examination of the stem-and-leaf plots, and the size of the weighted mean correlations (M_r) with and without the data points in question did not suggest undue influence. Therefore, all available data were included in the analyses.[9]

Results of both marginal distributions tests (mean effect sizes with confidence intervals for each of the six correlates) and moderation analyses are presented in Tables 3 through 11. As described in the Method section, a conditionally random effects procedure was employed in model selection. That is, the fixed effects model was employed in preliminary data analyses, but test results consistently revealed significant heterogeneity in the effect size distribution for both the marginal distribution and in moderation tests. Hence, the data were reanalyzed employing the maximum likelihood random effects model.[10] Estimates of the overall mean effect size were calculated employing the random effects model, and the mixed effects model was employed when investigating moderators.

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[9] See Table A2 in the Appendix for more detail. Corresponding scatterplots, boxplots, and stem-and-leaf plots are shown in Figures A1 to A18.

[10] All analyses presented here were conducted employing SPSS macros developed by Wilson. Copies of these macros can be downloaded from http://mason.gmu.edu/~dwilsonb/ma.html.

In cases where moderation test results involving more than two subgroups were significant, orthogonal post-hoc contrasts were conducted to determine which means actually differed significantly from one another. Orthogonal contrasts were chosen over pairwise comparisons because they offer three important advantages: (a) they are more parsimonious, (b) orthogonal contrasts are (by definition) independent whereas multiple pairwise comparisons often account for the same relative differences between means, and (c) they do not require adjustments to significance level such as Bonferroni corrections to avoid inflation of the Type I error rate. This can be a particularly crucial advantage when the number of subgroups is large (T. Bodner, "Post-hoc Tests in Meta-analytic ANOVA Tutorial," personal communication, June 12, 2009).

The I^2 index was employed to provide a measure of the degree of inconsistency in results obtained across studies. The I^2 statistic describes the percentage of total variation in observed effect sizes that should be attributed to heterogeneity rather than subject-level sampling error. Categories of heterogeneity are divided roughly into quartiles with I^2 values of 25% or less representing low levels of heterogeneity, values around 50% indicating moderate heterogeneity, and values of 75% or above reflecting high levels of heterogeneity (Higgins, Thompson, Deeks, & Altman, 2006).

The *fail-safe N* is a statistic developed by Rosenthal (1979) to determine the number of additional studies with null results would be needed to lower the cumulative z below a specified alpha level (e.g., $z \leq 1.65, p \leq .05$). Orwin (1983) adapted Rosenthal's approach for use with standardized mean differences and

correlation coefficients. Thus, the *fail-safe N* is used to establish how many studies from the "fugitive literature" (unpublished studies that may be difficult to locate) with effect sizes of zero would be required to reduce the mean effect size to a value too small to be considered meaningful (typically, .10 or less; Lipsey & Wilson, 2001).[11]

Analysis Results

Subjective Well-Being

Omnibus Test Results: Hardiness-SWB Relationship

The first set of analyses focused on the relationship between hardiness and subjective well-being. Results are summarized in Table 3. Consistent with H_{1a}, a significant, positive relationship was observed between hardiness and SWB. More specifically, the weighted mean of the effect size distribution (M_r) was .46 and the weighted standard deviation of the effect sizes (SD_r) was relatively large at .22 ($Z = 11.83, p < .001$ under the random effects model). Similarly, results of the homogeneity test and a large I^2 index (88%) suggested high levels of heterogeneity in the observed effect sizes. Taken together, these results suggest a relatively strong relationship between hardiness and subjective well-being but also indicate substantial variability in effect sizes obtained across studies. Results of moderation tests are described below.

[11] The formula for calculating the *fail-safe N* is: $k_0 = k\,[(\text{MeanES}_k/\text{MeanES}_c) - 1]$ where k_0 is the number of studies with an effect size of zero needed to reduce the mean effect size to MeanES_c, k is the number of studies included when calculating the mean effect size, and MeanES_c is the criterion effect size level (e.g., $M_r = .10$).

Hardiness-Well-Being Moderators

Hardiness instrument. As stated in H_{3a}, I expected third and fourth generation instruments to show a significantly stronger relationship with SWB than second generation instruments. My findings failed to support this hypothesis as the moderation test was not significant (i.e., the *p*-value for $Q_{Between}$ was greater than .05 under the mixed effects model). However, I^2 indices hovered around the 90% mark, suggesting very high levels of heterogeneity in all three categories (i.e., approximately 90% of the observed within-group variability is probably attributable to heterogeneity rather than sampling error). Because the small number of studies available for two of the categories (three studies employed the CHS and four studies employed 2nd generation instruments) may have contributed to the high heterogeneity estimates, an additional analysis was conducted with the CHS and 2nd generation categories combined (only two studies used eclectic instruments, so this category was excluded from the analyses). However, results were substantively the same.

Well-being assessment category. Although inspection of the weighted mean effect sizes reveals surprisingly substantial differences in the effect sizes across categories (M_r values = .30, .47, and .48 for affective, cognitive, and combination measures respectively), moderation test results provide no evidence that assessment category has a significant influence on the observed relationships between hardiness and SWB ($Q_{Between}$ (2) = 3.25, p =.20 under the mixed effects model). It should be noted that the small number of studies available for the affective (k = 3) and combined (k = 4) categories may have contributed to instability in the estimates, thus reducing

the power of the moderation test. I^2 indices showed relatively high levels of heterogeneity, ranging from 61% for affective measures to 84% and 87% for cognitive and combination measures respectively.

Gender. Moderation testing under the fixed effects model failed to show significant between-group differences for women and men. Moreover, mean effect size values calculated under the random effects model were virtually identical at M_r = .44 for both genders. Interestingly, I^2 values suggested moderate levels of heterogeneity among studies employing female samples (52%) but very high levels of heterogeneity among male samples (93%).

Sample. Four sample type categories were formed for this analysis: students, working adults, older adults, and community samples. While M_r values ranged from .37 among community samples to .49 among older adults, moderation test results were non-significant ($Q_{Between}(3) = 1.12, p = .77$ under the mixed effects model). Interestingly, the community sample category showed the greatest consistency across studies, showing an I^2 index of 0% (i.e., all of the variability in observed effect sizes can be attributed to subject-level error variance). Other classifications showed high levels of heterogeneity with I^2 indices ranging from 88% to 93%.

Hardiness-SWB Analysis Summary

Overall, hardiness showed a strong relationship with SWB while heterogeneity testing indicated substantial variability in effect sizes observed across studies. Moderation testing under the fixed effects model revealed no significant between-group differences for generation of hardiness measure, type of well-being measure

employed, gender, sample characteristics, or publication status. Interestingly, although the I^2 indices for most subgroups tested continued to show high very levels of heterogeneity, there were three exceptions. (1) Studies employing affective measures of well-being displayed somewhat more moderate levels of heterogeneity than studies employing cognitive or combination measures. (2) Studies based on female samples showed moderate levels of heterogeneity while studies employing male samples showed very high levels of variability observed effect sizes. (3) Community samples showed virtually no heterogeneity while I^2 indices for all other categories of sample characteristics were quite high.

Table 3
Summary Statistics for Hardiness-SWB Relationship: Tests of Marginal Distribution and Moderating Variables

				Effect Size		*ANOVA-Analog Tests:*		
	N	*K*	*Fail-safe*	Range	M_r (95% *CI*)	*Q* (*p*-value)		I^2
			N		Random/Mixed	Between	Within	
Total Sample	5,745	31	112	.16 to .77	.46** (.39, .52)			88%
Moderator Tests								
Hardiness Measure – CHS analyzed separately[a]						1.12 (.57)		
2nd generation	982	4	16	.35 to .77	.49** (.33, .63)		7.20 (.07)	90%
3rd/4th generation	3,797	22	75	.16 to .68	.44** (.37, .51)		18.01 (.65)	86%
CHS	790	3	13	.42 to .67	.53** (.35, .67)		2.11 (.35)	83%
Hardiness Measure – CHS/2nd generation combined[a]						1.00 (.32)		
CHS/2nd generation	1,772	7	29	.35 to .77	.51** (.39, .61)		9.36 (.15)	90%
3rd/4th generation	3,797	22	75	.16 to .68	.44** (.37, .51)		17.88 (.66)	86%
Assessment Category						3.25 (.20)		
Affective	819	3	6	.16 to .39	.30** (.09, .48)		1.02 (.60)	61%
Cognitive	3,863	24	89	.23 to .77	.47** (.41, .53)		24.92 (.35)	84%
Combination[a]	1,063	4	15	.32 to .67	.48** (.31, .61)		3.75 (.29)	87%
Gender[b]						0.24 (.63)		
Women	464	5	17	.27 to .63	.44** (.29, .57)		3.50 (.62)	42%
Men	1,492	7	27	.16 to .68	.48** (.37, .58)		8.00 (.24)	91%

Table 3 (continued)
Summary Statistics for Hardiness-SWB Relationship: Moderation Testing for Publication Status

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	Within	I^2
Sample[c]						1.12 (.77)		
Community	590	6	18	.27 to .68	.40** (.26, .53)		2.57 (.86)	0%
Students	1,413	5	18	.27 to .57	.45** (.30, .58)		2.93 (.57)	82%
Working adults	2,686	10	36	.16 to .67	.46** (.36, .55)		10.69 (.30)	92%
Older adults	1,030	9	35	.23 to .77	.49** (.38, .59)		13.31 (.10)	87%
Publication Status						0.02 (.88)		
Published	2,942	11	40	.16 to .68	.46** (.37, .55)		9.77 (.46)	91%
Unpublished	2,803	20	72	.23 to .77	.46** (.37, .53)		19.55 (.42)	83%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; *Fail-safe N* = the number of studies with null findings required to reduce the absolute value of M_r to .10; Range = the smallest and largest effect sizes observed; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. All analyses were conducted under the random effects model (the mixed effects model was employed for moderation testing). Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Statistically significant between-group differences are signified by $p < .05$ for $Q_{Between}$. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error.

[a] Two studies used eclectic/study specific instruments. This category was excluded from moderation testing for hardiness measure.

[b] Category includes SWB instruments that assessed a combination of cognitive and affective aspects of SWB.

[c] Includes studies where at least 90% of the participants are of a single gender or studies reporting results for men and women separately.

[d] Only one study employed a medical sample, so this category was not included in the analysis.

Psychological Distress

Omnibus Test Results: Hardiness-Distress Relationship

The second set of analyses focused on the relationship between hardiness and psychological distress. These findings are summarized in Table 4. Consistent with H_{1b}, analysis results showed a significant, negative relationship (M_r = -.43, Z = 27.40, p < .001 under the random effects model; SD_r = .15). However, a significant homogeneity test combined with a large I^2 value (79%) suggest that study-level moderators may be present. Findings relating to moderation tests are discussed below.

Hardiness-Distress Moderators

Hardiness instrument. Moderation test results revealed differences in weighted mean hardiness-distress correlations across generations of hardiness instruments. The M_r values calculated under the random effects model ranged from -.45 for the third generation instruments to -.26 for eclectic measures. Second generation instruments fell about halfway between, displaying an M_r value of -.35, while the weighted mean correlation for fourth generation instruments (M_r = -.43) was quite similar to for value calculated for third generation measures. The CHS was excluded from the final analyses due to excessive heterogeneity. That is, even the mixed effects model was unable to accommodate the amount of variability in the effect sizes, given the relatively small number of studies available for this category (k = 6).

The pattern of results revealed in these analyses failed to support expectations that the weighted mean correlations would be stronger among studies using second generation instruments than among studies using third or fourth generation

instruments (H_{3b}). In fact, it appears that the opposite may be true. Also contrary to *a priori* expectations, the I^2 index suggested low levels of heterogeneity among studies employing second generation hardiness instruments (I^2 = 27%) while studies employing later generations of hardiness instruments showed moderate (I^2 = 57% among fourth generation instruments) to high levels of heterogeneity (I^2 = 72% among third generation instruments).

Post-hoc tests for generation of hardiness instrument. As shown in Table 5, results of a series of orthogonal contrasts revealed that (a) eclectic instruments displayed significantly weaker relationships with distress than other categories, (b) second generation instruments demonstrated a weaker relationship with distress than later (third and fourth generation) instruments, and (c) third and fourth generation instruments did not differ significantly from one another. More specifically, when the weighted mean correlation for the eclectic category (M_r = -.26) was compared with the mean for the second, third, and fourth generation instruments (M_r = -.43), statistically significant differences were observed. Similarly, second generation (M_r = -.35) instruments displayed a weaker relationship with distress than the mean of third and fourth generation instruments.

Category of distress assessment. As stated in H_{1c}, I expected to see a stronger relationship between hardiness and distress among studies among employing general distress assessments relative to those assessing depression or anxiety. However, while moderation test results were significant, examination of mean effect sizes for each of the distress categories revealed that the strongest mean effect size was obtained among

studies utilizing depression measures to assess distress (M_r = .47) while M_r values were quite similar for the anxiety and general distress assessment categories (.39 and .41 respectively). Inspection of I^2 indices showed moderate levels of heterogeneity for the depression and anxiety categories (I^2 = 62% for both) and high levels of heterogeneity for the general distress category (I^2 = 85%).

Post-hoc test results for assessment category. As shown in Table 5, post-hoc testing revealed significant differences between depression and general distress effect sizes. However, there were no significant differences between the anxiety M_r value (-.39) and the depression/general distress category mean (-.43).

Gender. Moderation testing under the mixed effects model showed no significant between-group differences for women and men, and the mean effect size values were quite similar at M_r = -.44 and -.42 respectively. Further, I^2 values indicated high levels of heterogeneity in both groups (I^2 = 81% for women and 86% for men).

Sample. Seven sample categories were formed for this analysis: students, individuals in teaching and helping occupations (e.g., healthcare, social work, clinical psychology), managers and professionals, non-military working adults, military and paramilitary personnel (e.g., police, firefighters), medical samples, and other (community samples, athletes, and older adults). Although the range of weighted mean effect sizes was rather large, moderation testing produced non-significant results. M_r values were lowest among managers/professionals (-.36) and highest among individuals in teaching or helping occupations and working adult (-.46 for both), while

students, military/paramilitary personnel, and medical samples all showed similar weighted mean correlations (-.42, -.39, and -.42 respectively). I^2 indices suggested relatively high levels of heterogeneity among most of the groups, but the medical samples group showed very low levels of heterogeneity at $I^2 = 19\%$.

Publication status. Test results provided no evidence that publication status (published vs. non-published) moderated the relationship between hardiness and distress. Weighted mean effect sizes were nearly identical across categories ($M_r = -.43$ for published studies and -.42 for unpublished). I^2 indices indicate high levels of heterogeneity in both categories.

Hardiness-Distress Analysis Summary

Overall, there appears to be a strong negative relationship between hardiness and psychological distress. As shown in Table 4, moderation testing revealed significant between-group differences for generation of hardiness measure and distress assessment category. In contrast, gender, sample characteristics, and publication status do not appear to moderate the hardiness-distress relationship. Similar to the SWB analyses, within-group heterogeneity tests showed substantial effect size variability for all but two sub-groups: studies employing second generation hardiness instruments and medical samples showed low levels of within-group variability (I^2 values = 27% and 19% respectively).

Table 4
Summary Statistics for Hardiness-Distress Relationship: Tests of Marginal Distribution and Moderating Variables

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	*ANOVA-Analog Tests:* *Q* (*p*-value) Within	I^2
Total Sample	20,469	94	310	-.10 to -.63	-.43** (-.40, -.45)		452.83 (.00)	79%
Moderator Tests								
Hardiness Measure: All categories						22.16 (.00)		
2nd generation	1,930	13	33	-.10 to -.48	-.35** (-.28, -.41)		7.67 (.81)	37%
3rd generation	11,500	60	210	-.16 to -.62	-.45** (-.42, -.48)		59.16 (.47)	72%
4th generation	3,725	9	30	-.28 to -.63	-.43** (-.35, -.50)		7.07 (.53)	65%
CHS	1,060	6	23	-.18 to -.60	-.48** (-.39, -.55)		11.47 (.04)	85%
Eclectic	2,254	6	10	-.17 to -.55	-.26** (-.16, -.36)		5.21 (.39)	64%
Hardiness Measure: CHS excluded[a]						22.45 (.00)		
2nd generation	1,930	13	33	-.10 to -.48	-.35** (-.28, -.41)		8.13 (.77)	27%
3rd generation	11,500	60	210	-.16 to -.62	-.45** (-.43, -.48)		63.20 (.33)	71%
4th generation	3,725	9	30	-.28 to -.63	-.43** (-.36, -.50)		7.50 (.48)	57%
Eclectic	2,254	6	10	-.17 to -.55	-.26** (-.16, -.36)		5.48 (.36)	49%
Type of Distress Measure						5.90 (.05)		
Anxiety	2,331	14	41	-.18 to -.63	-.39** (-.32, -.46)		11.78 (.55)	62%
Depression	4,291	31	115	-.24 to -.62	-.47** (-.43, -.51)		22.85 (.82)	62%
General Distress	13,847	49	152	-.10 to -.61	-.41** (-.37, -.44)		53.61 (.27)	85%

Table 4 (continued)

Summary Statistics for Hardiness-Distress Relationship: Moderation Testing for Sample Type and Publication Status

	N	*K*	*Fail-safe N*	*Effect Size* Range	*M_r* (95% *CI*) Mixed Model	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	Within	I^2
Gender[b]						0.28 (.60)		
Women	3,907	23	78	-.17 to -.63	-.44** (-.38, -.49)		18.06 (.70)	81%
Men	7,325	24	77	-.20 to -.62	-.42** (-.37, -.47)		23.99 (.40)	86%
Sample						4.54 (.60)		
Managers/professionals	1,344	8	21	-.20 to -.51	-.36** (-.27, -.45)		4.45 (.73)	61%
Military/paramilitary	3,395	8	23	-.10 to -.53	-.39** (-.30, -.47)		6.53 (.48)	72%
Students	5,525	32	102	-.24 to -.60	-.42** (-.38, -.47)		26.93 (.68)	68%
Medical	782	8	26	-.17 to -.55	-.42** (-.32, -.51)		4.21 (.76)	19%
Working adults	2,063	10	36	-.30 to -.61	-.46** (-.38, -.53)		7.27 (.61)	72%
Teaching/helping professions[c]	1,453	9	32	-.16 to -.63	-.46** (-.38, -.54)		10.00 (.26)	76%
Other (community, athletes, older adults)	5,907	19	65	-.18 to -.62	-.44** (-.39, -.49)		29.10 (.05)	92%
Publication Status						0.06 (.81)		
Published	10,408	48	158	-.16 to -.62	-.43** (-.39, -.46)		39.35 (.78)	75%
Unpublished	10,061	46	147	-.10 to -.63	-.42** (-.39, -.46)		49.62 (.29)	82%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; *Fail-safe N* = the number of studies with null findings required to reduce the absolute value of M_r to .10; Range = the smallest and largest effect sizes observed; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. *Fail-safe N* is the number of additional studies with full findings required to reduce the absolute value of M_r to .10. All analyses were conducted under the random effects model (the mixed effects model was employed for moderation testing). Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Statistically significant between-group

Table 4 Notes (continued)

differences are signified by $p < .05$ for $Q_{Between}$. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error.

[a] CHS excluded due to excessive heterogeneity (i.e., significant Q_{Within} under the mixed effects model).

[b] At least 90% of the participants in the sample are of a single gender or results for men and women reported separately.

[c] Helping professions include healthcare and human services (e.g., social workers, clergy, clinical psychologists).

Table 5
Post-hoc Orthogonal Contrasts: Generation of Hardiness Measure and Distress Assessment Category

	K	*Effect Size* M_r (95% *CI*) *RE Model*	*ANOVA-Analog Test* *Q* (*p*-value) *Between*	*Within*
Hardiness Measure: CHS excluded				
Contrast 1			12.04 (.00)	
Group 1 = Eclectic vs.	6	-.26** (-.15, -.36)		5.10 (.40)
Group 2 = Mean: 2nd/3rd/4th generation	82	-.43** (-.41, -.46)		79.93 (.51)
Contrast 2			8.22 (.00)	
Group 1 = 2nd generation vs.	13	-.35** (-.28, -.41)		7.89 (.79)
Group 2 = Mean: 3rd/4th generation	69	-.45** (-.43, -.47)		68.66 (.45)
Contrast 3			0.22 (.64)	
Group 1 = 3rd generation vs.	60	-.45** (-.42, -.48)		58.17 (.51)
Group 2 = 4th generation	9	-.43** (-.35, -.50)		6.96 (.54)
Distress Assessment Category				
Contrast 1			1.15 (.28)	
Group 1 = Anxiety vs.	14	-.39** (-.32, -.46)		11.38 (.58)
Group 2 = Mean: Depression, General Distress	80	-.43** (-.40, -.46)		77.75 (.52)
Contrast 2			4.55 (.03)	
Group 1 = Depression vs.	31	-.47** (-.43, -.51)		22.19 (.85)
Group 2 = General Distress	49	-.41** (-.37, -.44)		51.93 (.32)

Notes. Effect sizes (ES) are in the correlation metric. *K* = number of distinct samples; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. All analyses were conducted under the random effects model. Statistically significant between-group are signified by $p < .05$ for $Q_{Between}$.

Job Satisfaction

Omnibus Test Results: Hardiness-Job Satisfaction Relationship

Consistent with H_{1d}, hardiness showed a significant, positive relationship with job satisfaction ($M_r = .40$, $Z = 10.84$, $p < .001$ under the random effects model; $SD_r = .15$). Thus, hardiness appears to be relatively strongly correlated with job satisfaction. However, as with the general well-being analyses, a statistically significant homogeneity test and large I^2 index (88%) point to considerable variability in effect sizes. Moderation test results are detailed below.

Hardiness-Job Satisfaction Moderators

Hardiness instrument. As stated in H_{3c}, I expected second generation instruments to show a stronger weighted mean correlation with illness/injury than third/fourth generation instruments. Moderation tests failed to support this hypothesis as no significant between-group differences were detected. As shown in Table 6, the weighted means of the effect size distributions did not differ greatly ($M_r = .42$ and .39 for second generation/eclectic and third/fourth generation instruments respectively.) The I^2 indices suggest similar levels of heterogeneity across the different classes of hardiness instruments (79% for second generation or eclectic instruments and 90% for third/fourth generation instruments). However, these findings should be viewed with caution due to (a) the small number of studies available for the second generation and eclectic category and (b) the variety of instruments represented within this category. While it would be desirable to create separate categories for studies employing second generation and eclectic measures of hardiness, it was not feasible in this instance

because there were only two studies in each subgroup (i.e., two studies employed a second generation instrument and two studies employed study specific instruments to explore the hardiness-job satisfaction relationship). Therefore, it was necessary to combine these categories to create a rather diverse category comprised of studies employing less thoroughly refined instruments.

Occupation. As shown in Table 6, two classification schemes were used for occupation. The first set (with three separate occupational classifications) should be viewed as tentative because the assumptions of the mixed effects model were violated (i.e., there was significant within-group heterogeneity in the teaching/helping professions, $I^2 = 93\%$). The second analysis involved further aggregation into a dichotomous classification structure (working adults and managers/professionals), thus avoiding a violation of the assumptions behind the mixed effects model. Results of both analyses are presented here because differences in the mean effect sizes for the working adult categories are interesting. When a three category classification scheme is used, the teaching/helping profession and manager/professional classifications show essentially the same weighted mean correlation ($M_r = .44$ and .43 respectively) while the correlation for the working adult category is smaller ($M_r = .36$). However, when the teaching/helping professions were aggregated into the working adult category, the difference between working adults and managers/professionals is markedly smaller ($M_r = .39$ and .43 respectively). These results suggest that hardiness may be more strongly related to job satisfaction among individuals in some occupations (such as

teaching, healthcare, and human services) than others. Thus, aggregating many dissimilar occupations together may obscure important underlying differences.

Gender and publication status. Gender was not tested as a potential moderator because only two studies employed a female sample when examining the relationship between hardiness and job satisfaction. Moderation test results for publication status were not significant, although non-published studies showed extremely high levels of heterogeneity (I^2 = 93%) while published studies displayed more moderate variability in effect sizes observed across studies (I^2 = 65%).

Hardiness-Job Satisfaction Analysis Summary

As shown in Table 6, there appears to be a strong, positive correlation between hardiness and job satisfaction. While moderation test results failed to reveal any significant between-group differences, results of exploratory analyses suggest that hardiness may be more strongly related to job satisfaction among individuals employed in people-intensive occupations such as healthcare and human services. However, high levels of heterogeneity within this category created statistical difficulties. Generation of hardiness instrument and publication status do not appear to moderate the hardiness-job satisfaction relationship. Gender was not tested as a moderator due to insufficient data. With one exception (published studies), I^2 indices indicate very high levels of within-group heterogeneity across all categories, indicating the presence of additional moderators or other sources of study-level variance that have not yet been identified.

Table 6

Summary Statistics for Hardiness-Job Satisfaction Relationship: Tests of Marginal Distribution and Moderating Variables

	N	*K*	*Fail-safe N*	*Effect Size* Range	*M_r* (95% *CI*) Random/Mixed	*ANOVA-Analog Test* *Q* (*p*-value) Between	Within	I^2
Total sample	6,273	18	54	.13 to .69	.40** (.33, .46)		146.89 (.00)	88%
Moderator Tests								
Hardiness Measure						0.08 (.77)		
2nd generation or eclectic	1,187	4	13	.32 to .57	.42** (.27, .55)		1.96 (.58)	79%
3rd/4th generation	5,086	14	41	.13 to .69	.39** (.32, .47)		16.15 (.24)	90%
Occupation: People-intensive occupations analyzed separately						1.38 (.50)		
Teaching /helping professions[a]	1,117	5	17	.13 to .69	.44** (.32, .46)		10.10 (.04)	93%
Working adults and students[b]	3,971	8	21	.15 to .54	.36** (.26, .45)		4.62 (.71)	85%
Managerial/professional	1,185	5	17	.26 to .57	.43** (.30, .54)		3.33 (.50)	80%
Occupation: Dichotomous						0.22 (.64)		
Working adults and students[b]	5,088	13	38	.13 to .69	.39** (.31, .47)		15.02 (.24)	90%
Managerial/professional	1,185	5	17	.26 to .57	.43** (.30, .54)		3.15 (.53)	85%
Publication Status						0.00 (.95)		
Published	2,868	9	27	.26 to .57	.40** (.30, .49)		3.49 (.90)	65%
Unpublished	3,405	9	27	.13 to .69	.40** (.30, .49)		14.61 (.07)	93%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; *Fail-safe N* = the number of studies with null findings required to reduce the absolute value of M_r to .10; Range = the smallest and largest effect sizes observed; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. *Fail-safe N* is the number of additional studies with full findings required to reduce the absolute value of M_r to .10. All analyses

Table 6 Notes (continued)

were conducted under the random effects model (the mixed effects model was employed for moderation testing). Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Statistically significant between-group differences are signified by $p < .05$ for $Q_{Between}$. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error. Gender was not tested as a moderator because only two studies examined the hardiness-job satisfaction relationship in a female sample.

[a] Helping professions included healthcare and human services (e.g., social work, clinical or counseling psychologists, clergy, caretakers).

[b] The single student sample consisted of undergraduate and graduate students employed in the athletic training profession.

Burnout

Omnibus Test Results: Hardiness-Burnout Relationship

The next set of analyses examined the relationship between hardiness and burnout. Results were consistent with H_{1e} in that hardiness showed a strong negative correlation with burnout (M_r = -.46, Z = -23.23, $p < .001$ under the random effects model; SD_r = .13). However, as shown in Table 7 heterogeneity analyses suggested that moderators might be present (I^2 = 72%). Findings relating to moderation tests are discussed below.

Hardiness-Burnout Moderators

Hardiness instrument. As shown in Table 7, test results indicated that generation of hardiness measure moderates the hardiness-burnout relationship. However, contrary to H_{3d}, the second generation instruments group showed the smallest weighted mean correlation (M_r = -.39) while third/fourth generation instruments and the CHS displayed stronger relationships with burnout (M_r = -.47 and -.55 respectively). The weighted mean correlation for eclectic instruments fell between second generation and third/fourth generation instruments (M_r = -.43). The I^2 indices point to relatively high levels of heterogeneity among studies using second generation instruments (72%), the CHS (70%), or eclectic instruments (68%), whereas the third/fourth generation instruments showed a moderate level of heterogeneity (54%). However, some of the heterogeneity in the CHS may be attributable to unstable estimates based on a small number of data points (i.e., only three studies were available for this category).

Post-hoc test results for generation of hardiness measure. As shown in Table 8, post-hoc testing revealed significant differences between the CHS (M_r = -.54) and instruments developed by hardiness researchers employing the Kobasa model (i.e., second and third generation instruments, M_r = -44). Group means for second and third generation instruments were also significantly different (M_r = -.38 and -.47 respectively). However, the weighted mean correlation for the eclectic instrument category (M_r = -.38) was not significantly different from the other three categories combined (CHS, second generation, and third generation instruments M_r = -.46).

Burnout Measure. No significant between-group differences were detected among studies employing different burnout assessments (MBI: Maslach Burnout Inventory, TBM: Tedium Burnout Measure, and SBS-HP: Staff Burnout Scale for Health Professionals, but studies employing the TBM or the SBS-HP showed considerably less effect size heterogeneity than the MBI (I^2 = 0%, 35% and 77% respectively). However, inspection of the study descriptions (see Table A1 in the Appendix) reveals that all of the studies employing the SBS-HP or the TBM assessed burnout in samples consisting of individuals working in healthcare. Thus, it seems likely that the relative effect size homogeneity in these groups was due to similarities in the samples rather than differences in the instruments employed to measure burnout.

Occupation. An intriguing pattern emerged when subgroups were formed based on occupational classification: Although moderation test results were non-significant and weighted mean correlations did not vary dramatically across groups (ranging from -.42 for teachers to -.48 for managers and professionals), the amount of

within-group heterogeneity varied considerably. Interestingly, the category consisting of a single occupation (teachers) displayed the highest level of within-group variability (I^2 = 82%). In contrast, the other single industry group (healthcare) displayed very little heterogeneity (I^2 = 19%). Unsurprisingly, the working adults/students and managers/professionals groups showed high levels of heterogeneity (76% and 78% respectively).

Gender and publication status. Gender was not tested as a potential moderator because only one study employed a male sample when examining the relationship between hardiness and burnout. Moderation test results for publication status were not significant, although published studies showed relatively high levels of heterogeneity (I^2 = 77%) while unpublished studies displayed more moderate variability in effect sizes observed across studies (I^2 = 57%).

Hardiness-Burnout Analysis Summary

Overall, hardiness displayed a strong, negative correlation with burnout, although moderation testing under the mixed effects model indicated there were significant between-groups differences across generations of hardiness measures. In post-hoc tests, the CHS showed a significantly stronger relationship with burnout than well-validated instruments developed under the Kobasa model (i.e., second, third, and fourth generation instruments). The hardiness-burnout relationship was also significantly stronger for third generation instruments relative to second generation measures.

I^2 indices suggested unexpectedly large differences in within-group heterogeneity for some categories. Specifically, 3rd generation instruments displayed moderate levels of heterogeneity while studies employing 2nd generation instruments, the CHS, and eclectic instruments all showed high levels of heterogeneity. Turning to occupational classifications, teachers showed very high levels of heterogeneity while healthcare workers displayed very little. Burnout measure, occupation, and publication status did not appear to moderate the hardiness-burnout relationship. Gender was not tested as a moderator due to insufficient data. As with previous analyses, large I^2 values across most categories suggest the need for further testing on subgroups to identify sources of variability beyond sampling error.

Table 7
Summary Statistics for Hardiness-Burnout Relationship: Tests of Marginal Distribution and Moderating Variables

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	*ANOVA-Analog Tests:* *Q* (*p*-value) Within	I^2
Total sample	9,289	44	158	-.13 to -.69	-.46** (-.43, -.49)		150.97 (.00)	72%
Moderator Tests								
Hardiness Measure						11.14 (.01)		
2nd generation	2,282	10	29	-.24 to -.55	-.39** (-.33, -.45)		10.93 (.36)	72%
3rd generation	5,241	24	89	-.29 to -.69	-.47** (-.43, -.51)		21.81 (.47)	54%
CHS	1,460	5	23	-.48 to -.64	-.55** (-.47, -.62)		2.98 (.39)	70%
Eclectic	275	4	13	-.13 to -.60	-.43** (-.33, -.52)		9.84 (.08)	68%
Burnout measure						1.28 (.53)		
Maslach Burnout Inventory	7,843	32	115	-.13 to -.69	-.46** (-.42, -.49)		38.25 (.17)	77%
Staff Burnout Scale	619	6	20	-.26 to -.55	-.44** (-.34, -.53)		3.43 (.63)	35%
Tedium Burnout Scale	827	6	25	-.43 to -.59	-.51** (-.41, -.59)		1.84 (.87)	0%
Occupation						2.00 (.57)		
Healthcare	2,723	19	70	-.26 to -.59	-.47** (-.42, -.52)		10.14 (.93)	19%
Teachers	3,533	9	29	-.24 to -.66	-.42** (-.35, -.49)		13.57 (.09)	82%
Managers/professionals	2,112	8	30	-.29 to -.64	-.48** (-.42, -.55)		8.35 (.30)	78%
Other (human services, working adults, students)	921	8	27	-.13 to -.69	-.44** (-.36, -.52)		13.15 (.07)	76%

Table 7 (continued)
Summary Statistics for Hardiness-Burnout Relationship: Moderation Testing for Publication Status

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	Within	I^2
Publication Status						0.25 (.61)		
Published	5,863	23	81	-.13 to -.64	-.45** (-.40, -.50)		25.00 (.30)	77%
Unpublished	3,426	21	78	-.24 to -.69	-.47** (-.42, -.51)		18.54 (.55)	57%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% CI represents 95% Confidence Interval estimates for the mean population effect size. All analyses were conducted under the random effects model (the mixed effects model was employed for moderation testing). Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Significant $Q_{Between}$ values indicate subgroup M_r values differ. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error under the fixed effects model. Gender was not tested as a moderator because only one study examined the hardiness-burnout relationship in a male sample.

Table 8
Burnout Post-hoc Orthogonal Contrasts: Generation of Hardiness Measure

	K	M_r (95% *CI*) *RE Model*	*Q* (*p*-value) *Between*	*Within*
Contrast 1			1.29 (.26)	
Group 1 = Eclectic vs.	4	-.38** (-.23, -.51)		6.96 (.07)
Group 2 = Mean: CHS/2nd/3rd generation	39	-.46** (-.43, -.50)		35.64 (.58)
Contrast 2			4.93 (.03)	
Group 1 = CHS vs.	5	-.54** (-.46, -.60)		3.14 (.53)
Group 2 = Mean: 2nd/3rd generation	34	-.44** (-.48, -.41)		43.95 (.23)
Contrast 3			5.96 (.01)	
Group 1 = 2nd generation vs.	10	-.38** (-.32, -.44)		11.19 (.26)
Group 2 = 3rd generation	24	-.47** (-.43, -.51)		23.09 (.46)

Notes. Effect sizes (ES) are in the correlation metric. *K* = number of distinct samples; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. All analyses were conducted under the random effects (RE) model. Statistically significant between-group differences are denoted by $p < .05$ for $Q_{Between}$.

Physical Health

Omnibus Test Results: Hardiness-Health Relationship

The next set of analyses focused on exploring the relationship between hardiness and health. As shown in Table 9, results of the omnibus test were consistent with H_{2a} as hardiness showed a significant, moderate positive correlation with individuals' perceptions of overall physical health ($M_r = .30$, $Z = 9.84$, $p < .001$ under the random effects model; $SD_r = .12$). However, a significant homogeneity test results

combined with the magnitude of the I^2 value (70%) suggested a substantial amount of heterogeneity in observed effect sizes.

Hardiness-Health Moderators

Moderation tests conducted under the mixed effects model for generation of hardiness measure, sample type, and publication status showed non-significant Q-test results. Thus, with the exception of gender, none of the variables previously identified as potential moderators in the literature appear to have a significant influence on the hardiness-health relationship. It was not possible to test gender as a moderator because only one of the studies included in the meta-analysis examined the hardiness-health relationship in a male sample.

Although moderation tests were non-significant and weighted mean correlations were similar across categories, there were substantial between-group differences in heterogeneity indices for generation of hardiness measure and sample characteristics. Second generation instruments showed no variability in effect sizes that could not be attributed to sampling error (I^2 = 0%) while the category consisting of third and fourth generation measures showed considerable heterogeneity (I^2 = 72%). Differences across sample categories were less pronounced, but still notable as student samples showed high levels of heterogeneity (I^2 = 86%) while medical samples (I^2 = 43%), community/working adult samples (I^2 = 57%), and older adults (I^2 = 61%) all showed moderate levels of variability. In contrast, published and non-published studies showed roughly comparable levels of variability (I^2 = 70% and 63% respectively).

Hardiness-Health Analysis Summary

Omnibus test results showed a moderate, positive correlation between hardiness and health with substantial variability in effect sizes observed across studies. However, none of the moderator variables tested demonstrated significant between-group differences under the mixed effect model and the weighted mean correlations were quite similar across categories. Despite the similarity in effect sizes, there were large differences in heterogeneity indices for generation of hardiness measure and sample type. In general these results seem to suggest that the relationship between hardiness and health may be rather complex, as there appear to be untested moderators or other currently unidentified sources of variability influencing the observed effect sizes.

Table 9
Summary Statistics for Hardiness-Health Relationship: Tests of Marginal Distribution and Moderating Variables

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	*ANOVA-Analog Tests:* *Q* (*p*-value) Within	I^2
Total Sample	3,527	18	36	.10 to .53	.30** (.24, .35)		56.56 (.00)	70%
Moderator Tests								
Hardiness Measure						0.08 (.77)		
2nd generation	472	4	7	.22 to .31	.28** (.16, .40)		0.37 (.95)	0%
3rd/4th generation	3,055	14	28	.10 to .53	.30** (.24, .36)		16.94 (.20)	72%
Sample[b]						1.33 (.72)		
Students	1,254	4	6	.10 to .37	.25** (.15, .35)		5.52 (.14)	86%
Medical samples	335	3	6	.20 to .53	.29** (.14, .42)		2.68 (.26)	43%
Community/working adults	1,221	6	14	.20 to .45	.33** (.24, .41)		4.69 (.46)	57%
Older adults	717	5	11	.17 to .45	.31** (.21, .40)		4.18 (.38)	61%
Publication Status						0.97 (.32)		
Published	1,387	7	16	.10 to .53	.33** (.25, .41)		9.14 (.17)	70%
Unpublished	2,140	11	20	.12 to .44	.28** (.21, .34)		8.29 (.60)	63%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; *Fail-safe N* = the number of studies with null findings required to reduce the absolute value of M_r to .10; Range = the smallest and largest effect sizes observed; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. *Fail-safe N* is the number of additional studies with full findings required to reduce the absolute value of M_r to .10. All analyses were conducted under the random effects model (the mixed effects model was employed for moderation testing).

Table 9 Notes (continued)

Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Statistically significant between-group differences are signified by $p < .05$ for $Q_{Between}$. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error. Gender was not tested as a moderator because only one study examined the hardiness-health relationship in a male sample.

[a] Additional analyses combining sample groups to create 3 categories (community and working adults, students, medical and older adults) or two categories (student vs. non-student) also produced non-significant between-group Q-values.

Illness/Injury

Omnibus Test Results: Hardiness-Illness/Injury Relationship

The final set of analyses examined the relationship between hardiness and illness/injury. Results are displayed in Table 10. Consistent with H_{2b}, hardiness showed a significant, though somewhat modest negative correlation with symptoms of illness/injury (M_r = -.24, Z = -10.50, $p < .001$ under the random effects model; SD_r = .16). However, results of the homogeneity test and the large I^2 value (83%) indicate there are high levels of heterogeneity in the effect sizes observed across studies.

Hardiness-Illness/Injury Moderators

Hardiness instrument. Moderation testing for generation of hardiness measure showed no significant between-group differences, although the weighted mean correlations ranged from -.13 for the CHS to -.27 for third generation instruments. Contrary to H_{4a}, second generation instruments did not show a stronger relationship with illness/injury than third generation instruments. Indeed, third generation instruments showed a stronger correlation, although the difference is small (M_r = -.27 and -.24 respectively). In contrast, the hardiness-illness/injury correlation was noticeably smaller for the CHS (M_r = -.13) and failed to reach statistical significance under the mixed effects model. These results should be viewed with caution as only three studies were available for analysis. It should also be noted that large I^2 values were noted for all four categories, ranging from 74% to for second generation instruments to 86% for third generation instruments. The CHS and eclectic instruments fell between at 81% and 79% respectively.

Gender. Test results examining gender as a possible moderator in the hardiness-illness/injury relationship were non-significant. Further, weighted mean effect sizes were quite similar across genders (r = -.27 for women and -.49 for men) while I^2 values suggested very high within-group heterogeneity (84% for both groups). Thus, these findings failed to provide any evidence that gender could be a moderator in the relationship between hardiness and illness/injury.

Sample. Moderation test results employing a three category classification scheme (working adults, students, and a miscellaneous category consisting of community, medical, and older adult samples) were not significant. Although it is possible that more homogeneous categories would have produced significant results, multiple attempts to create less diverse groups resulted in categories with significant within-group heterogeneity due to small *k*. Therefore, only results from the three-category classification scheme were interpreted. Mean correlations for subgroups ranged from -.20 for students to -.29 for the community/medical/older adult category. Working adults fell between at -.25. I^2 values indicated moderately high levels of heterogeneity among students (64%), while working adult and community samples showed greater heterogeneity (89% and 82%). There is also an additional caveat to be considered when interpreting these findings. The working adult category consistently showed high levels of within-group heterogeneity across all analyses. Thus, it seems likely that there is a moderator or other source of variance within this category and caution is warranted when interpreting these results.

Type of symptoms assessed. As shown in Table 10, moderation testing under the mixed effects model provides no evidence that the magnitude of the hardiness-illness/injury effect size varies across different types of assessments. As expected, the weighted mean effect size was smaller for medical measures of illness/injury relative to somatic measures, but the difference was not large (M_r = -.23 and -.27 respectively). Further, both types of assessments showed substantial I^2 values (83% for both), indicating considerable within-group heterogeneity.

Reporting source. Consistent with H_{4b}, large (and statistically significant) between-group differences in the magnitude of the effect sizes were observed for self-report vs. relatively objective measures. Studies using self-report measures generated a weighted mean effect size of -.26, while those employing objective indicators showed a much smaller (and statistically non-significant) effect size (M_r = -.06, p = .49). Further, I^2 indices for the objective indicators group showed moderate levels of heterogeneity (47%) while the self-report measure group showed substantial heterogeneity (82%). Given the diversity in assessment methods employed for the objective measures (e.g., length of hospital stay, number of health insurance claims filed), this comparative consistency is somewhat surprising.

Publication status. Moderation test results for publication status provided no evidence to suggest significant differences between published and unpublished studies. Similarly, weighted mean correlations were quite similar across categories (M_r = -.24 and -.23 respectively) while heterogeneity indices suggested substantial within-group variability (I^2 = 84% for published studies and 82% for non-published).

Hardiness-Illness/Injury Analysis Summary

Overall, hardiness showed a modest negative correlation with illness/injury while heterogeneity testing indicated high levels of variability in effect sizes observed across studies. Moderation tests conducted under the mixed effects model suggest that reporting source may significantly influence the hardiness-illness/injury relationship. Although there were relatively large differences in the weighted mean correlations across the various categories of hardiness instruments, moderation test results were non-significant. No significant between-group differences were found for generation of hardiness instrument, gender, sample characteristics, type of illness/injury assessment (somatic vs. medical), or publication status. I^2 values indicated moderate to high levels of heterogeneity for all of the groups tested in these analyses.

Table 10

Summary Statistics for Hardiness-Illness/Injury Relationship: Tests of Marginal Distribution and Moderating Variables

	N	*K*	*Fail-safe N*	*Effect Size* Range	*M*, (95% *CI*) Random/Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	Within	I^2
Total Sample	12,336	54	76	.10 to -.70	-.24** (-.20, -.28)		309.42 (.00)	83%
Moderator Tests								
Hardiness Measure						2.73 (.43)		
2nd generation	4,311	19	25	.09 to -.48	-.23** (-.15, -.31)		12.04 (.84)	74%
3rd generation	5,056	26	44	.10 to -.70	-.27** (-.20, -.34)		37.34 (.05)	86%
CHS	756	4	1	.02 to -.36	-.13 (.04, -.30)		2.67 (.45)	81%
Eclectic	2,213	5	5	-.40 to -.60	-.20* (-.04, -.34)		5.50 (.24)	79%
Gender[a]						0.03 (.87)		
Women	2,160	13	22	.09 to -.70	-.27** (-.17, -.37)		15.84 (.20)	84%
Men	2,272	8	15	.08 to -.48	-.29** (-.15, -.41)		6.61 (.47)	84%
Sample						1.62 (.45)		
Working adults	6,578	24	36	.10 to -.65	-.25** (-.18, -.32)		34.23 (.06)	88%
Students	4,589	20	20	-.07 to -.60	-.20** (-.12, -.28)		9.58 (.96)	64%
Community, medical, & older adult samples	1,169	10	19	.02 to -.70	-.29** (-.17, -.40)		13.32 (.15)	82%
Type of Assessment						0.75 (.39)		
Primarily medical	9,569	38	49	.10 to -.60	-.23** (-.17, -.28)		34.71 (.58)	83%
Somatic or minor ailments only	2,767	16	27	.08 to -.70	-.27** (-.18, -.36)		22.22 (.10)	83%

Table 10 (continued)

Summary Statistics for Hardiness-Illness/Injury Relationship: Moderation Testing for Reporting Source and Publication Status

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Mixed	*ANOVA-Analog Tests:* *Q* (*p*-value) Between	*ANOVA-Analog Tests:* *Q* (*p*-value) Within	I^2
Reporting source						6.08 (.01)		
Self-report	11,446	49	78	.09 to -.70	-.26** (-.21, -.30)		55.46 (.21)	82%
Objective indicators[b]	890	5	0	.10 to -.31	-.06 (-.21, .10)		2.41 (.66)	47%
Publication Status						0.05 (.82)		
Published	8,414	34	48	.10 to -.70	-.24** (-.18, -.30)		42.16 (.13)	84%
Unpublished	3,922	20	26	.02 to -.58	-.23** (-.15, -.31)		14.58 (.75)	82%

Notes. Effect sizes (ES) are in the correlation metric. *N* = cumulative sample size; *K* = number of distinct samples; *Fail-safe N* = the number of studies with null findings required to reduce the absolute value of M_r to .10; Range = the smallest and largest effect sizes observed; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. *Fail-safe N* is the number of additional studies with full findings required to reduce the absolute value of M_r to .10. All analyses were conducted under the random effects model (the mixed effects model was employed for moderation testing). Significant Q_{Within} test results ($p < .05$) indicate heterogeneous effect size distributions. Statistically significant between-group differences are signified by $p < .05$ for $Q_{Between}$. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error.

[a] Includes studies where at least 90% of the participants are of a single gender or studies reporting results for men and women separately.

[b] E.g., Length of hospital stay (controlling for injury severity), number of health insurance claims filed over a period of one year.

Hardiness Components

The final set of analyses examined the relationships of each hardiness component with the health and well-being correlates included in this study. As with analyses involving composite scores, homogeneity tests were significant for all correlates tested. Therefore, the random effects model was employed for all component-correlate analyses. Because these were exploratory analyses, moderation tests were not conducted on individual components. Analysis results are summarized in Table 11. All component/correlate relationships were statistically significant.

General Well-Being

Subjective well-being. Analysis results revealed large differences in the magnitude of the relationship between hardiness components and subjective well-being. M_r values ranged from .43 ($Z = 8.80, p < .001$; $SD_r = .17$) for commitment to .08 for challenge ($Z = 2.30, p = .02$; $SD_r = .11$). Control fell between at .35 ($Z = 9.50$, $p < .001$; $SD_r = .13$). Heterogeneity estimates for commitment and control were similar to those seen for the composite: commitment $I^2 = 85\%$ and control = 73%, while the composite I^2 value was 89%. Challenge showed more moderate levels of variability ($I^2 = 64\%$).

Psychological distress. Variability in effect sizes was less pronounced for negative well-being (psychological distress) relative to SWB. Similar to the previous analysis, commitment showed the strongest relationship with distress ($M_r = -.41$ $Z = -21.74, p < .001$; $SD_r = .13$), control was in the middle ($M_r = -.36$, $Z = -21.14, p < .001$; $SD_r = .11$) and challenge showed the weakest relationship ($M_r = -.21$, $Z = -8.67$, $p <$

.001; SD_r = .16). I^2 values suggested that variability in effect sizes across studies was comparable to that seen in composite analyses: commitment I^2 = 76%, control 71%, and challenge 84% (composite = 79%).

Work-Related Well-Being

Job Satisfaction. In terms of the magnitude of the component/correlate relationship, the pattern of results for job satisfaction was similar to the general well-being analyses but unlike SWB and distress, heterogeneity estimates varied widely. Commitment showed the strongest correlation with job satisfaction (M_r = .37, Z = 10.98, $p < .001$; SD_r = .08) while the control-satisfaction correlation was somewhat weaker (M_r = .31, Z = 6.35, $p < .001$; SD_r = .11). Challenge showed a modest correlation with job satisfaction (M_r = .15, Z = 7.18, $p < .001$; SD_r = .05). Interestingly, the three components generated very different heterogeneity estimates. Control showed a high level of variability in observed effect sizes (I^2 = 78%), commitment showed moderate heterogeneity (I^2 = 55%) while challenge showed no variability that could not attributed to sampling error (I^2 = 0%). Thus, it appears that there may be moderators in the component-job satisfaction relationship for commitment and control but not challenge, which could help to explain the high level of heterogeneity observed in the composite (I^2 = 88%).

Burnout. There were rather large differences in the mean component-burnout correlations. M_r values ranged from -.49 (Z = -19.41, $p < .001$; SD_r = .12) for commitment to -.21 (Z = -4.40, $p < .001$; SD_r = .22) for challenge with control falling between at -.38 (Z = -14.10, $p < .001$; SD_r = .13). Heterogeneity indices indicated

moderate heterogeneity estimates for commitment (I^2 = 58%) and control (I^2 = 60%) but challenge showed high levels of heterogeneity (I^2 = 87%).

Physical Health

Health perceptions. Relative to well-being correlates, mean effect sizes for health perceptions were smaller but more consistent. M_r values were quite similar for commitment (M_r = .26, Z = 6.81, p < .001; SD_r = .09) and control (M_r = .25, Z = 5.64, p < .001; SD_r = .11), while challenge showed a more modest correlation with health (M_r = .11, Z = 2.63, p = .01; SD_r = .11). Heterogeneity estimates for all three components were all in the moderate range (commitment I^2 = 49%, control I^2 = 62% and challenge I^2 = 58%) while the composite I^2 value suggested somewhat greater heterogeneity (I^2 = 70%).

Illness/Injury. Results relating to illness/injury were similar to those observed for health perceptions in terms of effect size magnitude, but I^2 values implied higher levels of heterogeneity. Commitment showed the strongest relationship with illness/injury (M_r = -.26, Z = -7.23, p < .001; SD_r = .15). Control showed a similar but slightly weaker relationship with illness/injury (M_r = -.22, Z = -5.86, p < .001; SD_r = .12) and the challenge-illness/injury effect size was smallest (M_r = -.12, Z = 3.96, p < .001; SD_r = .15). Heterogeneity estimates indicated moderately high to high levels of variability in effect sizes as the I^2 indices were 75% for commitment, 77% for control and 62% for challenge while the I^2 index for the composite was 83%.

Table 11

Summary Statistics for Composite- and Component-Correlate Relationships: Tests of Marginal Distributions

	N	*K*	*Fail-safe N*	*Effect Size* Range	*Effect Size* M_r (95% *CI*) Random	*ANOVA-Analog Tests* *Q* (*p*-value) Random	I^2
Subjective Well-Being	**5,745**	**31**	**112**	**.16 to .77**	**.46** (.39, .52)**	**267.11 (.00)**	
Commitment	3,233	13	43	.14 to .62	.43** (.34, .51)	95.91 (.00)	85%
Control	3,233	13	33	.16 to .52	.35** (.28, .42)	51.42 (.00)	73%
Challenge	3,233	13	0	-.06 to .35	.08** (.01, .14)	39.41 (.00)	64%
Psychological Distress	**20,469**	**94**	**310**	**-.10 to -.63**	**-.43** (-.40, -.45)**	**452.83 (.00)**	
Commitment	12,119	50	155	-.02 to -.62	-.41** (-.38, -.44)	193.10 (.00)	74%
Control	12,119	50	130	-.09 to -.64	-.36** (-.33, -.39)	145.93 (.00)	65%
Challenge	12,119	50	55	.11 to -.59	-.21** (-.17, -.26)	315.40 (.00)	84%
Job Satisfaction	**6,273**	**18**	54	**.13 to .69**	**.40** (.33, .46)**	**146.89 (.00)**	
Commitment	3,169	8	22	.28 to .62	.37** (.31, .43)	20.18 (.01)	55%
Control	3,169	8	17	.11 to .46	.31** (.21, .39)	40.78 (.00)	78%
Challenge	3,169	8	4	.05 to .33	.15** (.11, .19)	8.36 (.30)	0%
Burnout	**9,289**	**44**	**158**	**-.13 to -.69**	**-.46** (-.43, -.49)**	**150.97 (.00)**	
Commitment	3,996	24	94	-.21 to -.65	-.49** (-.45, -.53)	59.76 (.00)	58%
Control	3,996	24	67	-.05 to -.60	-.38** (-.33, -.42)	61.99 (.00)	60%
Challenge	3,996	24	26	.20 to -.48	-.21** (-.12, -.29)	185.28 (.00)	87%
Health	**3,527**	**18**	**36**	**.10 to .53**	**.30** (.24, .35)**	**56.56 (.00)**	
Commitment	1,859	8	13	.13 to .39	.26** (.19, .33)	17.55 (.01)	49%
Control	1,859	8	12	.14 to .39	.25** (.17, .33)	23.43 (.00)	62%
Challenge	1,859	8	1	-.11 to .32	.11** (.03, .20)	21.51 (.00)	58%
Illness/Injury	**12,336**	**54**	**76**	**.10 to -.70**	**-.24** (-.20, -.28)**	**309.42 (.00)**	
Commitment	3,863	20	32	.01 to -.57	-.26** (-.19, -.33)	82.66 (.00)	75%
Control	3,863	20	24	.00 to -.54	-.22** (-.15, -.29)	90.56 (.00)	77%
Challenge	3,863	20	4	.05 to -.50	-.12** (-.06, -.18)	55.79 (.00)	62%

Table 11 Notes

Effect sizes (ES) are in the correlation metric. N = cumulative sample size; K = number of distinct samples; M_r is a weighted mean of the effect size distribution. Astericks (**) following the M_r statistic indicate effect size is significantly different from zero at $p < .01$.The 95% *CI* represents 95% Confidence Interval estimates for the mean population effect size. All analyses were conducted under the random effects model. Significant Q-test results ($p < .05$) indicate heterogeneous effect size distributions. I^2 describes the percentage of total variation across studies that can be attributed to heterogeneity rather than sampling error under the fixed effects model. **Material in bold relates to analyses conducted using composite scores.** Material in regular typeface pertains to component analyses.

DISCUSSION

This study makes several important contributions to the literature. It is the first quantitative review to systematically examine the relationship between hardiness and its components (commitment, control, and challenge) with positive and negative aspects of well-being. It is also the first review to specifically focus on examining both general and work-related aspects of well-being. Although this was not the first meta-analysis to examine the relationship between hardiness and physical or mental health, this study provided a more comprehensive review. Moreover, this meta-analysis specifically tested several moderators that had not been investigated in previous research. It was also the first hardiness meta-analyses to provide estimates of heterogeneity in effect sizes observed across studies. Thus, I was able to contribute several new insights to those provided by the Mills (2000) study.

Overall, four major patterns of findings stand out as particularly noteworthy. First, although hardiness showed moderate to relatively strong weighted mean correlations with indicators of health and well-being, surprisingly high levels of heterogeneity were observed across all categories of correlates examined in this study. Second, results of this study suggest that the conceptual model underlying the measures used to assess hardiness and other constructs may significantly influence the patterns of relationships observed across studies. Third, despite the evaluation of a relatively extensive collection of potential moderators and the identification of multiple measurement-related issues, there remain large amounts of unexplained heterogeneity within subgroups. Thus, there may be multiple moderators or process-

oriented moderators that have yet to be identified. Finally, when components were analyzed, results were only partially supportive of conclusions drawn in narrative reviews. That is, while the challenge component consistently showed the weakest relationships and commitment the strongest with all correlates included, evidence regarding consistency was more mixed as each component showed high levels of heterogeneity with some correlates and low heterogeneity with others. Taken together, the findings from this study help to explain the level of disagreement that has emerged in the narrative reviews and they highlight several areas in need of more focused research in the future.

Implications for Measurement Issues

Moderation test results indicate that generation of hardiness instrument systematically influences the relationship between hardiness and negative well-being (psychological distress and burnout). However, I did not find evidence that use of second versus third or fourth generation instruments moderates the relationships between hardiness and positive well-being correlates (SWB and job satisfaction). These findings are important because they suggest that later instruments may produce findings that are more in keeping with hardiness theory. That is, second generation instruments were essentially empirically derived and focused on the presence of vulnerabilities, whereas third and fourth generation instruments were theoretically derived and contain a mixture of both positively- and negatively-worded items (i.e., both strengths and weaknesses were assessed). Because third and fourth generation instruments displayed stronger relationships with negative well-being correlates, the

pattern of results observed in this meta-analysis suggests that later instruments may be more effective at capturing the stress-buffering properties of hardiness. In other words, the positive aspects of hardiness may provide resources that can be drawn upon during a stressful encounter to mitigate the impact of demanding or unwanted events. Because the second generation of instruments focus on vulnerabilities, they may be less effective at capturing the protective aspects of hardiness.

Findings from this study also indicate that characteristics of assessment measures employed to measure physical health and well-being related correlates can systematically influence the pattern of relationships observed. Based on the results of this study, it appears that equivalence across assessment categories should be established prior to making comparisons. For example, the weighted mean correlation for depression was significantly stronger than correlations observed for other distress categories. Similarly, reporting source for illness and injury appears to substantially impact the magnitude of the relationship. In both instances the differences observed in this study have interesting theoretical implications that are described in later sections.

Hardiness Composite Omnibus Tests

General and Occupational Well-Being

Findings from the present study indicate that hardiness typically shows moderately strong relationships in the expected directions with both positive and negative indicators of well-being. Specifically, hardiness correlated positively with subjective well-being (M_r = .46) and job satisfaction (M_r = .39). Conversely, hardiness

showed negative correlations with psychological distress (M_r = -.43) and burnout (M_r = -.46). While these relationships have been generally accepted by hardiness theorists for some time, this is the first study that establishes an empirically derived common estimate of the strength of the observed relationships. I was also able to establish empirical evidence supporting the relative efficacy of hardiness in both work and life domains. This is an important point because researchers have repeatedly raised questions about whether the influence of hardiness is similar across work and non-work domains (Beardslee, White, & Richter, 1995; C. Lambert & Lambert, 1999; V. Lambert & Lambert, 1987; Wiebe & Williams, 1992). Several of these researchers have expressed concern that hardiness may be more important in the work domain than other aspects of people's lives. Evidence from this meta-analysis should help to alleviate these concerns.

It is interesting to note that the hardiness-job satisfaction correlation was stronger than anticipated. Given that job satisfaction has multiple antecedents, many of which are environmental rather than personal, combined with the fact that most job satisfaction assessments focus on satisfaction with characteristics of the job rather than on the quality of an individual's experiences within the work environment, I anticipated a modest correlation. However, meta-analysis results showed a relatively strong correlation, suggesting that hardiness and other cognitively-oriented personality traits may make an important contribution to the intra-individual stability researchers have observed in job satisfaction research (e.g., Judge & Bono, 2001; Judge & Locke, 1993; Staw, 2004; Tokar, Fischer, & Subich, 1998).

In contrast to job satisfaction, no surprises emerged in the omnibus tests for the relationships between hardiness and SWB, psychological distress, or burnout. Hardiness displayed moderately strong relationships in the expected direction with each correlate. However, it is valuable to obtain empirical confirmation of expectations that are based on narrative reviews. This is especially true for burnout because there is little consistency in reporting of relationships between various aspects of these two meta-constructs. Since each construct consists of a tripartite structure (at least for studies employing the MBI), several different combinations are possible, depending on the author's primary interest. Some authors have reported correlations only between component scores for both constructs (in which case nine separate correlations are reported), others have focused on hardiness and burnout composite scores (reporting a single hardiness-burnout correlation), and still others have reported correlations between the composite score for one construct and the components of the other (reporting three separate correlations). This variability in the presentation of results pertaining to the hardiness-burnout relationship makes it particularly difficult to discern patterns of findings across studies in the absence of statistical summaries.

One final point that that should be noted concerns heterogeneity in effect sizes. Heterogeneity estimates (percentage of observed variability in effect sizes that cannot be attributed to sampling error alone) were quite high for all four well-being indicators, which suggests the presence of moderators or other sources of variability. Results of moderation testing for well-being indicators are discussed in a later section.

Health-Related Correlates

The relationship between hardiness and physical health has been extensively evaluated in the literature, but the assessment instruments used have varied widely. Similar to well-being indicators, this study examined the pattern of findings from research focusing on both positive and negative indicators of physical health. Specifically, some researchers have asked participants to provide information about their perceptions of their overall health status while others have concentrated on measuring illness/injury.

Overall, hardiness showed a moderate, positive relationship with perceptions of physical health (M_r = .30) and a slightly weaker negative relationship with illness/injury (M_r = -.24). Interestingly, despite a relatively high level of observed heterogeneity in effect sizes, none of the variables tested in these analyses (generation of hardiness instrument, sample type, and publication status) appeared to moderate the relationship between hardiness and health perceptions. These results suggest the presence of untested moderators or other sources of variance in the hardiness-health relationship that have not yet been identified. Similarly, although several potential moderators for the hardiness-illness relationship were tested (generation of hardiness instrument, gender, sample characteristics, type of assessment, reporting source, and publication status), only reporting source (self vs. more objective measures) showed significant between-group differences.

Moderation Testing

Generation of Hardiness Measure

Positive and Negative Well-Being

Because third/fourth generation instruments contain a combination of positively- and negatively-worded items whereas second generation instruments rely exclusively on negatively worded items, I hypothesized that third/fourth generation instruments would show stronger relationships with positive well-being indices (SWB and job satisfaction). Conversely, I expected second generation instruments to show stronger relationships with indicators of negative well-being (psychological distress and burnout). My findings did not support these expectations. In fact, to some degree, the opposite pattern emerged. That is, moderation test results failed to provide any evidence that generation of hardiness instrument significantly influences the relationship between hardiness and either of the positive well-being correlates tested in this study.[12] On the other hand, moderation test results did indicate there were significant differences for negative well-being correlates with third/fourth generation instruments showed *stronger* relationships with psychological distress and burnout than second generation instruments.

In view of findings by Sinclair and Tetrick (2000) and Chan (2003), these results have interesting implications. As noted in the introduction, their research

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[12] Although no significant differences were detected for well-being correlates, it is interesting to note that the weighted mean correlations were somewhat stronger for second generation instruments relative to third and fourth generation instruments. Because few studies employed second generation instruments when examining these correlates, effect size estimates, are less stable and moderation tests had limited power to detect between-group differences.

findings have produced evidence that positively and negatively worded items may measure different aspects of the hardiness domain. That is, positively worded hardiness items predicted different types of health and performance outcomes than negatively worded items. Results from this meta-analysis suggest that these differences may have been partially due to item content rather than item wording as positively worded items may have tapped a different set of themes than negatively worded items. That is, certain types of content may have lent themselves more naturally to positive or negative wording. For example, it would be awkward to reword items such as "Thinking of yourself as a free person just leads to frustration" or "People who do their best should get full support from society"[13] to tap the positive aspects of hardiness.

Global Health Perceptions and Illness/Injury

Physical health. Moderation tests for the physical health correlate produced a rather interesting finding. Although there is no evidence that generation of hardiness instrument influences the strength of the relationship between hardiness and health perceptions, there were large differences in the consistency of the correlations observed across studies. While second generation instruments showed no variability in effect sizes that could not be attributed to subject-level sampling error, third/fourth generation instruments showed high levels of heterogeneity. These results are of intriguing because they suggest that the relationship between hardiness and physical health is relatively straightforward when second generation instruments are employed,

[13] These items from the DRS are intended to tap the negative aspects of commitment and challenge.

while the instruments that were specifically designed to measure hardiness appear to include new sources of variability.

Illness/injury. Moderation test results suggested there were no significant differences in mean effect sizes among the various categories of hardiness measures. However, inspection of the weighted mean correlations for individual categories reveals an interesting difference between instruments that are based on the Kobasa model and the CHS: The weighted mean correlation was smaller and not statistically significant for the CHS, while all other categories showed significant correlations with illness/injury. Moreover, the combination of high heterogeneity within groups and small *k* for the CHS reduced the power of the moderation test considerably.

Assessment Categories for Hardiness Correlates

Subjective Well-being

Based on the tenets of process theory (Lightsey, 1996), I expected to find that affective and cognitive measures of SWB would show similar relationships with hardiness. As described previously, process theory assumes that psychological resources such as hardiness may create a positive bias in the individual's information processing system, which influences the individual's affective experiences. That is, mental models influence ongoing cognitive appraisals, which in turn shape the pattern of activation for the biological reward system and the harm avoidance system. More frequent activation of the reward system should result in more positive general evaluations and relatively high levels of positive affect. As expected, moderation

testing failed to reveal any significant between-group differences across well-being assessment categories. However, some caution in interpreting these findings is warranted as there were only three studies available for the affective well-being category, which showed a substantially smaller weighted mean correlation relative to the cognitive and combination measures. Further, the high level of heterogeneity observed within categories suggests that there may be other moderators involved.

Psychological Distress

Based on the cognitive specificity hypothesis (A. Beck & Clark, 1988) and the tripartite model (L. Clark & Watson, 1991), I expected hardiness to show a stronger relationship with general distress than with depression or anxiety ($Hypothesis_{1c}$). These frameworks postulate that anxiety and depression typically arise from the activation of dysfunctional mental models in response to daily events. In contrast, the general distress syndrome is broader and less differentiated. It is characterized by general demoralization, high levels of reactivity to negative stimuli, and frequently experiencing a variety of unpleasant emotions. Because hardiness and the general distress syndrome both represent characteristic appraisal patterns, I expected these two constructs to show the strongest relationship. However, a different pattern of results emerged: Anxiety and general distress showed very similar weighted mean correlations with hardiness while depression displayed a stronger relationship.

It is possible that anxiety shows a weaker relationship with hardiness than other aspects of psychological distress because it is more closely linked with physiological arousal (Riskind & Alloy, 2006). As such, it may display a stronger

biological component. A biological predisposition toward interpreting incoming stimuli as potentially threatening could create a bias toward the formation and activation of danger schemata (mental models). However, a more plausible alternative is suggested by a unique attribute of the depression syndrome. While anxiety and general distress are characterized by negative thoughts and feelings (i.e., repeated activation of the harm avoidance system), depression is also characterized by a lack of positive affect (i.e., underactivation of the biological reward system). This explanation is consistent with the assumptions underlying the fourth generation of hardiness instruments. Based on a combination of theoretical developments (e.g., Sinclair & Oliver, 2003; Sinclair & Tucker, 2006) and empirical data (e.g., Chan, 2003; Oliver, 2005; Sinclair & Tetrick, 2000), the fourth generation instruments assume that positive and negative aspects of hardiness each make distinct contributions to stress resilience. Because anxiety and general distress are primarily marked by frequent activation of negative schemata (with correspondingly high levels of negative affect), there may be limited opportunities for the positive hardiness dimensions to influence these syndromes. In contrast, depression involves a combination of high levels of negative affect and low levels of positive affect. As noted in the introduction, depressed individuals are apt to dwell upon themes of failure or loss to the exclusion of more positive experiences. Thus, positive aspects of hardiness may operate as a protective factor because it introduces a systematic bias toward more optimistic appraisal patterns with a corresponding increase in positive emotional experiences.

Burnout. Results indicate that the assessment used to measure burnout does not moderate the relationship between hardiness and burnout, although large differences in heterogeneity were observed. Studies employing the Maslach Burnout Scale showed high levels of heterogeneity while studies employing unidimensional measures (the Staff Burnout Scale for Health Professionals and the Tedium Burnout Measure) showed much less variability in effect sizes. However, studies employing the MBI to assess burnout varied widely in terms of study level variables such as sample size, sample composition (e.g., occupation, percentage female), and generation of hardiness measure. There was comparatively little variability in study characteristics when unidimensional burnout measures were employed (see Table A1 in the Appendix for study descriptions). Thus, it is unclear whether the heterogeneity observed among studies employing the MBI should be attributed to properties of the measure, to the consistency of the samples (i.e., all healthcare professionals, mostly nurses, mostly females), or both.

Medical vs. somatic assessments and reporting source. Moderation tests were included for assessment type (medical vs. somatic) and reporting source (self vs. more objective indicators) because they represented two possible sources of artifactual variance (i.e., systematic variation introduced through measurement error). My findings suggest that assessment type is not a concern, but there are issues relating to reporting source that deserve further consideration as the difference in the mean effect sizes calculated for the hardiness-illness/injury relationship was quite substantial for self-report vs. more objective measures. In fact, the weighted mean correlation

between hardiness and objective measures of illness/injury failed to reach statistical significance. However, there is a critical caveat that needs to be considered: The objective measures all included injuries.[14] Although it is certainly possible that hardiness affects injury recovery, no theoretical links have been proposed in the literature. Rather, hardiness theory is concerned with failures of the immune system to fight off pathogens due to the immunosuppressive properties of stress. Therefore, measures that include injuries may provide an inappropriate test for hardiness theory.

Exploratory Analyses

As discussed previously, moderation test results from all of the correlates suggested the presence of moderators or other unidentified sources of variance beyond those proposed *a priori*. In re-examining the literature to identify additional moderators, I found that researchers have focused on demographic characteristics such as gender, age, or occupation. For example, Huang (1995) has argued that hardiness may be more effective for some populations than others (e.g., males vs. females, working adults vs. students, individuals from varying socioeconomic levels) and there is considerable disagreement in the literature regarding possible gender differences.

[14] Examples include: number of health insurance claims filed over a 2-year period, number of contacts with a healthcare provider or number of health insurance claims filed over a 1-year period, days of sick leave used over a 3-year period, and adjusted length of hospital stay, controlling for severity of injury and previous health status.

Gender

Over the years, reviewers have debated concerns about the generalizability of hardiness across genders many times. Because the hardiness construct was originally empirically derived from a sample of white, male executives, some authors raised concerns that stress resilience may be associated with a different constellation of traits for women than for men (Cox & Ferguson, 1991; Just, 1999), while others have argued that hardiness appears to predict health outcomes better for men than for women (V. Lambert & Lambert, 1987; Lightsey, 1996). Several authors have asserted that on the whole, existing evidence does not seem to support gender differences (Funk, 1992; Jennings & Staggers, 1994; Lawler, Kline, Harriman, & Kelly, 1999; Maddi, 1998), and a few have commented that the evidence is too unclear to draw any conclusions (C. Lambert & Lambert, 1999; Low, 1999; Ouellette, 1993). Thus, a quantitative synthesis across multiple correlates can help to clarify the relationship between hardiness and gender.

Although far from definitive, findings from this study do not support gender differences. While it was only possible to test gender as a moderator for three of the six correlates included in this study (subjective well-being, psychological distress, and illness/injury), none of those tests produced significant results. Currently, relatively few studies report separate results for each gender or use single gender samples. Further research that examines hardiness-correlates for men and women separately is needed, particularly in the realm of occupational well-being.

Sample Characteristics

Several demographic variables other than gender have been discussed in the hardiness literature, but few of these characteristics have been researched thoroughly enough to allow for meta-analytic investigation. Two characteristics that have attracted research attention are occupation and age/life stage. For instance, Funk (1992) observed that hardiness may buffer stress more effectively in some occupations than others while Kobasa (1987) and Beardslee, White, and Richter (1995) pointed out that job level or military rank may moderate the hardiness-outcome relationship. Orr and Westman (1990) noted that (a) the characteristics of hardiness may be most relevant for certain types of demands, such as those faced by executives at work and (b) there may be limited variability in health status among younger populations such as students. Further, Ouellette (also known as Kobasa; 1993) pointed out that the structure of the hardiness construct was shaped by developmental literature. As such, the developmental tasks associated with adulthood were influential in determining which traits were expected to affect resilience. Therefore, it may not generalize to people in other life stages that are facing different developmental tasks (e.g., older adults, the chronically ill).

Sample Composition Analyses

Although none of the moderation tests for sample composition were significant, there were some interesting differences in heterogeneity across subgroups/categories. Researchers focusing on specific outcomes tend to emphasize different populations, which makes it is somewhat difficult to identify generalizable

patterns for the various sample types.[15] Nevertheless, examination of the heterogeneity estimates across correlates revealed a couple of interesting findings among occupational well-being correlates. First, I^2 indices were substantial in categories that included teachers for both occupational well-being correlates (job satisfaction and burnout). However, while I^2 indices were high across all categories for job satisfaction (with the teaching/helping professions category showing an extraordinarily high value at 93%), heterogeneity indices for burnout varied considerably. Whereas the healthcare worker category displayed very limited variability in the effect sizes, studies employing teacher samples showed substantial heterogeneity, exceeding even the miscellaneous category consisting of human service workers, working adults, and students. Thus, there appear to be moderators in the hardiness-burnout relationship for some occupations but not others and future research is needed to identify factors that may contribute to the high levels of variability within the teaching profession.[16]

Publication Status

The final set of moderation tests involved evaluating the effects of publication status on effect sizes. Typically, published studies are more comprehensively represented in literature reviews because they are easier to identify and acquire. However, it is often difficult to publish studies that do not show large effect sizes or significant results. Therefore, a review focusing solely on published sources could

[15] For example, life satisfaction researchers were more likely to employ older adult samples whereas samples of healthcare professionals were most often used among burnout researchers.
[16] Six of the studies included in this analysis described their samples as consisting of elementary or high school teachers. The other two studies did not provide information about teaching context.

easily be biased. Results from this study suggest this is not a concern as effect sizes do not appear to be systematically larger (or smaller) among published studies for the correlates included in this meta-analysis.

Hardiness Components

As noted in the introduction, possible differences in the relative contributions of hardiness components have been extensively discussed in the literature (e.g., Funk, 1992; Just, 1999; Lawler, Kline, Harriman, & Kelly, 1999; Orr & Westman, 1990; Ouellette, 1993). While some authors have advocated dropping challenge from the hardiness construct (cf., Hull, Van Treuren, & Virnelli, 1987), others have pointed out that the strength of the relationship between hardiness components and correlates in different domains appears to vary.

I have argued against dropping a critical component of the hardiness system based on the principles of systems science. Further, several authors have pointed out that each component appears to predict some outcomes better than others (Blaney & Ganellen, 1990; Lachman, 1996; Taylor & Aspinwall, 1996). Thus, judging the effectiveness of hardiness components based on a subset of outcomes may produce misleading results if critical aspects of the content domain are not included in the evaluation. Conversely, conflicting results are likely to be observed if all relevant aspects of the content domain are included.

I believe that developing a clearer understanding of the relationships between the hardiness sub-systems (i.e., the components) and correlates from positive and

negative aspects of the health and well-being domains may help to spur new research and provide new insights that can guide the development of new interventions. That is, understanding which belief systems appear to be associated with the biggest differences for specific aspects of health and well-being could allow researchers and practitioners to develop more targeted interventions.

Component Analysis Results: Positive and Negative Well-Being

In general the patterns of relationships between hardiness components and well-being indices were congruent with observations from narrative reviews. As expected, commitment showed the strongest relationships with all aspects of well-being examined in this study, while challenge consistently displayed the weakest relationships and control fell between the two. SWB displayed rather extreme differences in the strength of the relationships between components and correlates (ranging from M_r = .43 for commitment to .08 for challenge) while the other indices of well-being all showed smaller and relatively consistent differences between components.

As shown in Table 11, the correlations between positive and negative aspects of general well-being (i.e., SWB and psychological distress) were of similar magnitude for commitment and control, while challenge showed greater differences between positive and negative well-being indices. That is, challenge showed a noticeably stronger correlation with psychological distress relative to subjective well-being. Occupational well-being also showed a different pattern of similarities and differences between components. Although all three components showed stronger

relationships with burnout than job satisfaction, commitment showed relatively substantial differences in the magnitude of the weighted mean effect sizes, while control and challenge showed smaller (and comparable) differences between the positive and negative aspects of work-related well-being.

Although direction of causality cannot be determined through a correlational design, when viewed through the lens of hardiness theory, these results suggest that the hardiness components may operate somewhat differently across life domains. That is, commitment and control appear to influence positive (life satisfaction, affective well-being) and negative (psychological distress) aspects of general well-being about equally, whereas in the work domain, each appears to exert a stronger influence in protecting against burnout than as a dispositional tendency to experience higher levels of job satisfaction.

When heterogeneity indices are taken into account, the pattern becomes slightly more complex. Heterogeneity indices for component-correlate relationships suggest the presence of moderators in all instances except the challenge-job satisfaction relationship. Thus, the relationship between challenge and job satisfaction appears to be relatively straightforward, while the relationships between challenge and other aspects of well-being measured in this study are more complex. For example, the high level of variability in the correlations between challenge and burnout strongly suggests the presence of moderators. Similarly, indicators of negative well-being (psychological distress and burnout) showed more variability than positive indicators. This could indicate that moderators on the negative side may be either more powerful

or more numerous. However, research findings by Sinclair and colleagues (Sinclair & Oliver, 2003; Sinclair, Oliver, & Ippolito, 2003) suggest a plausible alternative. The greater variability observed in study results examining negative outcomes may be a reflection of difficulties in measuring the negative aspect of challenge adequately.

In developing, validating, and refining a fourth generation hardiness instrument to assess both negative and positive dimensions for each component, we have consistently found that the negative dimension of challenge showed weaker psychometric properties (e.g., internal consistency reliability, factor loadings, correlations between facets/scales) and lower predictive validity relative to the other five dimensions. In contrast, the psychometric properties and predictive validity of the positive challenge dimension were comparable to the commitment facet across various correlates and samples (Sinclair & Oliver, 2003; Sinclair, Oliver, Ippolito, & Ascalon, 2003; Sinclair & Sears, 2007).[17] Given that all of the studies used in this meta-analysis merged the negative and positive dimensions into a single component, the lackluster performance of the challenge component may be due to difficulties measuring the negative aspect of challenge rather than problems with the challenge component in general.

Health Perceptions and Illness/Injury

In general, the pattern of results observed in these analyses was similar to the well-being analyses, although the relationships were more modest. Commitment and

[17] Although the most recent version of a measure currently under development called the Personal Resilience Scale has shown more promise.

control showed stronger relationships with indicators of physical health or illness/injury than challenge, but the differences between components were less pronounced. Examination of the heterogeneity indices also suggests that there may be differences in the level of consistency across the three components for health-related correlates. Similar to the hardiness composite, there appears to be greater consistency in effect sizes when global perceptions of health are measured relative to less subjective indices (i.e., experience of specific illnesses or injuries), and this difference is rather pronounced for the commitment component.

Although these results are consistent with observations made in previous reviews, it is not necessarily the pattern one would hypothesize based on hardiness theory or Epel et al.'s (1998) model of thriving. Hardiness theory posits that the challenge component predisposes an individual to view novel or demanding experiences as opportunities for growth, while Epel and colleagues note that the opportunity for possible gain represents a key difference between challenge and threat appraisals. If there is a chance of incurring loss or harm, a threat appraisal will be made. If the individual also perceives a demanding situation as providing an opportunity gain, a challenge appraisal will be made. As noted previously, challenge appraisals allow for efficient mobilization of energy with less physiological wear and tear. Clearly, one would expect individuals high in challenge to make more challenge appraisals, but Epel et al. also note that challenge and threat appraisals are not mutually exclusive. That is, an individual may view an event as containing both the opportunity for gain and the potential for harm or loss. Thus, both challenge and threat

appraisal tendencies may have a crucial role to play in the relationship between hardiness and health. As discussed previously, the negative aspect of challenge (which should correspond to a tendency to make threat appraisals) is more difficult to measure than other hardiness facets. It is likely that the quality of measurement on the negative challenge dimension is lower than for other hardiness facets and its influence on health may be under-represented.

In summary, findings from this study support arguments made by reviewers who argue that commitment (and to a lesser extent control) has shown greater predictive power across correlates (e.g., Hull, Van Treuren & Virnelli, 1987; Lightsey, 1996; Orr & Westman, 1990), but evidence regarding consistency is more mixed. That is, the relative magnitude of the I^2 indices for the hardiness components varied across correlates. For example, challenge displayed virtually no heterogeneity for job satisfaction while commitment and control displayed moderate and high levels of heterogeneity, respectively. Conversely, challenge showed high heterogeneity while commitment and control showed moderate effect size variability for the burnout correlate. Further, in keeping with observations by several researchers (e.g., Blaney & Ganellen, 1990; Lachman, 1996; Taylor & Aspinwall, 1996), there also appear to be some differences in the way the different components operate across life domains with commitment and control showing more similarity in the strength of relationships with positive and negative aspects of general vs. work-related well-being. Finally, although the challenge component showed statistically significant relationships with all of the correlates included in this study, those correlations were consistently quite modest as

hardiness researchers continue to struggle with developing measures that adequately assess the challenge component.

Limitations and Future Research

Limitations

Although this study has a number of strengths, there are also some limitations that need to be considered when interpreting the results. The most serious limitation relates to inclusion and exclusion criteria. Because this is a quantitative synthesis, I was only able to include studies that reported correlations or statistics that could be converted to the correlation metric. All studies that reported only multivariate analysis results (e.g., multiple regression, factor analysis, structural equation modeling) had to be excluded. Thus, it was impossible to include many relevant studies. While this particular problem is shared by all meta-analytic studies, it is an important caveat that should be considered. This point emphasizes the different contributions made by qualitative and quantitative reviews. Qualitative reviews can be less restrictive in their inclusion criteria, but they suffer from the potential for subjectivity, and it is quite difficult to adequately summarize a large number of studies in a narrative format. Quantitative reviews allow for the creation of statistical summaries that can facilitate comparisons between large numbers of studies and help to uncover previously unrecognized discrepancies.

A second limitation that should be considered is the use of the mixed effects model for interpreting between-group differences. As described in the results section,

the fixed effects model allows for greater precision and more statistical power. When confronted with heterogeneity, it is preferable to identify the sources of excessive variability (e.g., moderators) and rerun the analyses employing more homogeneous subgroups. The mixed effects model allows for comparisons to be made between groups, despite high levels of within-group variability, but the estimate is less precise, often resulting in very wide confidence intervals. Thus, potentially meaningful differences in mean effect sizes may not be detected (i.e., the Type II error rate is higher). Nevertheless, it does provide a systematic method for obtaining estimates for sub-groups even in the presence of "noisy" data and can help to clarify where additional research is needed.

Because meta-analyses are dependent on existing studies, a researcher's ability to provide full coverage of the content domain is often limited. This study was no exception. In several cases, it was necessary to combine somewhat disparate categories into a larger category in order analyze the data. This approach has the advantage of creating larger subgroups with more stable estimates, but it can limit the interpretability of the results. For example, when examining generation of hardiness measure as a moderator, it was sometimes necessary to combine the second generation and eclectic instruments. In most of the analyses, the eclectic instruments displayed the weakest relationships with hardiness correlates. Thus, the combined effect size could be smaller than the effect size for the second generation instruments alone. Similarly, it was sometimes necessary to combine several categories of sample characteristics into a single "miscellaneous" category or varied occupations into a

"working adults" category. For example, community, medical, and older adult samples were combined when assessing the hardiness-illness/injury relationship and the healthcare, human services, teachers, military, and working adults categories were combined when examining the hardiness-job satisfaction relationship. Although I was able to extract some information regarding the job satisfaction correlate and use that information to support suggestions for future research, a more detailed breakdown of various occupations would have been preferable.

Finally, although I examined as many moderators as was feasible, given the scope of this meta-analysis and the studies currently available, I was not able to identify the source of the excessive variability in effect sizes across all of the correlates included in this study. Even in those cases where significant moderators were successfully identified, within group heterogeneity remained high for most categories. Further, I was not able to test for multiple moderators due to small *K* within most of the categories. Thus, it remains unclear how much of the heterogeneity observed within subgroups should be attributed to multiple moderators or moderators that have not yet been tested versus study-level sampling error.

Directions for Future Research

This study illustrates many gaps in the literature. Some of these gaps have been described in the preceding sections but there are also several more general trends that need to be addressed. Summary descriptions of specific issues and general trends in need of additional research are provided below. These descriptions are organized by

correlate when the issue is more closely related to a specific content domain and by moderator when the issue has more general implications.

Correlates

Subjective well-being. The relationship between hardiness and affective well-being remains under-investigated. Although a respectable number of studies have examined the relationship between hardiness and cognitively-based SWB, only three studies have used affectively-based measures. While moderation test results for assessment category were non-significant, there were sizeable differences in the weighted mean correlations. Establishing a more reliable estimate of the relationship between hardiness and affective SWB would allow researchers to more effectively address questions regarding the equivalence of different types of measures of SWB, at least as far as the influence of cognitively-oriented constructs such as hardiness are concerned.

Psychological distress. The hardiness-distress relationship represents another area in need of more focused research. Several hardiness researchers have commented that there appears to be some evidence suggesting that occupation and/or job level (e.g., managers or professionals vs. regular staff positions) moderates the relationship between hardiness and distress (Beardslee, White, & Richter, 1995; Funk, 1992; Kobasa, 1982, 1985, 1987). Results of this meta-analysis do not provide support for these statements, but at times it was necessary to aggregate some rather disparate occupational groups together (e.g., healthcare, human services, and teachers). This probably contributed to the high levels of heterogeneity observed. It would be helpful

to obtain more information about the hardiness-distress relationship from a variety of studies with more homogeneous occupational groups to allow researchers to identify which (if any) occupational characteristics moderate the hardiness-distress relationship (e.g., self-selection processes vs. job characteristics). Additional research is also needed to identify other demographic characteristics that may influence the relationship between hardiness and distress (e.g., life stage, SES).

Job satisfaction. Compared with other well-being related outcomes, relatively few studies have examined the potential influence of hardiness on job satisfaction. Similarly, although the influence of dispositional characteristics on job satisfaction has attracted increased interest in recent years, more research examining the influence of cognitive traits such as hardiness on job satisfaction is needed. Results of this meta-analysis indicate that hardiness predicts job satisfaction but also revealed extensive heterogeneity across studies. Moderation test results for occupation were non-significant, but the relatively small number of available studies necessitated aggregating studies into only two very broad categories (working adults and managers/professionals). A larger number of studies examining hardiness and job satisfaction among people from a variety of occupations would allow meta-analysts to identify specific occupational families that may show stronger or weaker relationships between hardiness and job satisfaction. Further, more targeted research would allow for the exploration of underlying mechanisms involved, using guidelines suggested by the S-O-R model. For example, hardy individuals tend to be deeply committed to the social institutions they become involved in and to seek out challenges to support

personal growth. Thus, hardy people may self-select into occupations that are relatively demanding and impose comparatively high levels of responsibility but also provide some autonomy. Such occupations are also likely to provide more opportunities for hardiness to influence occupational well-being through cognition and evocation processes as defined in the S-O-R model. Thus, occupations such as nursing, teaching, social work, military service, and management may provide more opportunities for hardiness to influence job satisfaction. Conversely, hardiness may be less influential in routine jobs providing few opportunities to exercise autonomy or reappraise experiences positively such as work in clerical occupations, factories, or call centers.

Burnout. A similar gap emerged in the hardiness-burnout literature. While there is an extensive body of research examining the relationship between hardiness and burnout among healthcare personnel (particularly nurses), relatively few studies have explored this issue in other job families. Thus, there is still too little data to determine whether there are systematic differences among individuals working in other industries or occupational families. One profession in need of particular attention is teaching. The highest heterogeneity estimate was observed in this category, despite the fact that other categories combined much more varied occupations (e.g., human services, working adults, and students) and contained an equivalent number of studies. Because sample descriptions for several of the studies on teachers were quite limited, it was not possible to identify the source(s) of this unusually high variability within

one profession from currently available data. Future research studies which include more detailed sample descriptions are needed to explore this unexpected phenomenon.

Physical Health. As noted previously, the heterogeneity estimate for the hardiness-health relationship was high, but none of the variables tested in this study emerged as significant moderators. To date, there has been very little theoretical development to identify factors that might systematically influence the hardiness-health relationship, probably because most of the research in this arena has concentrated on health-related hardiness rather than general hardiness. However, generation of hardiness instrument is one area of investigation that could be informative. Currently, no studies have been conducted that employ fourth generation instruments or the CHS to explore the relationship between hardiness and health. Future empirical work could examine the relationships between positive and negative aspects of hardiness to explore which dimensions appear to influence individuals' assessments of physical health. Similarly, future research could either provide evidence showing a link between the CHS and health or confirm that this model is better suited to understanding the influence of hardiness on psychological processes and outcomes than physical health.

Illness/injury. Meta-analytic exploration of the hardiness-illness/injury relationship revealed a crucial area in need of additional study: reporting source (self vs. relatively objective measures). As noted previously, several authors have raised concerns that use of self-report data could bias the results. Findings from this study reveal that these concerns may be justified, as non self-report measures showed a

much weaker relationship between hardiness and illness/injury. However, because all of the studies using non self-report data included injuries as well as illnesses, the data are not equivalent. As discussed above, there are no theoretical links between hardiness and injuries. Future studies that use non self-report data focusing on illness symptoms (e.g., medical records reviews that record instances of treatment for illnesses only) would help to clarify the influence of reporting source on the hardiness-illness relationship.

Sample characteristics represent another area in need of additional investigation. Although no significant between-groups differences were detected in this study, there were few studies available in several categories of concern to hardiness researchers. Specifically, additional studies involving medical samples and older adults would allow future meta-analytic studies to examine these sample categories separately. Further, hardiness researchers have previously expressed concern that occupation, occupational level, or socioeconomic status may moderate the hardiness-illness relationship. For example, the relationship between hardiness and illness may be quite different for white collar professionals than military personnel. Healthcare workers may also show a distinctly different pattern than other groups of working adults. Because they are exposed to biological pathogens more often than other working adults, opportunities for hardiness to affect health may be exaggerated or diminished. Intermittent exposure to high levels of stress may provide more opportunities for physical thriving among hardy individuals (Epel, McEwan, & Ickovics, 1998). On the other hand, with constant exposure to a variety of pathogens,

the biological component may overwhelm the effects of psychological processes. Thus, it would be helpful to be able to examine the hardiness-illness relationship healthcare professionals separately. Similar arguments could be made for other groups (e.g., older adults, military samples, low SES populations).

Generation of hardiness measure. Results of this study suggest that refinements introduced in the later generations of hardiness instruments have produced somewhat mixed results. Thus, more focused investigation of this issue is needed. One set of questions that could be explored in future research involves examining item-level differences between various generations of hardiness generations to gain insight into why the patterns of relationships did not conform with *a priori* expectations. For example: Why were the hardiness-health correlations more consistent for second generation instruments? Why do second generation instruments produce more consistent effect sizes for psychological distress while third generation instruments are more consistent for burnout? One possible explanation is that existential malaise (feeling alienated, purposeless, and disillusioned) may be more closely related to distress than existential health (experiencing a sense belonging and that one's life has meaning) is to perceptions of well-being.

Hardiness is a complex meta-construct composed of three components that encompass broad patterns of cognitive appraisals. To some degree, second generation instruments were empirically derived. That is, assessments showing the strongest relationships with illness/injury were retained while others were discarded. Kobasa identified commonalities in the constructs being tapped by these assessments and

developed hardiness theory based on the tenets of existential psychology. Third generation instruments were specifically designed to measure the constructs identified by hardiness theory. Thus, third generation instruments may have integrated the existential aspect of hardiness more thoroughly. If existential health is less closely related to well-being than existential malaise is to distress, it would have the effect of introducing more "noise" into empirical relationship between hardiness and well-being (i.e., more of the variance in the hardiness variable may be unrelated to the dependent variable). If that is the case, the question becomes: to what extent should hardiness be defined by existential theory versus the construct's nomological network?

A similar set of questions and comparisons could be considered for third and fourth generation instruments based on Kobasa's model and the CHS model of hardiness. Preliminary evidence indicates that hardiness as conceptualized in the CHS may have limited impact on illness/injury (i.e., the weighted mean correlation for the CHS category was noticeably weaker and failed to reach statistical significance.) However, findings from this study are inconclusive because comparatively few studies for the CHS category were available. Clearer evidence that the CHS is not significantly related to physical illness would raise questions about the equivalence of the conceptual models proposed by Kobasa and Nowack. Therefore, this represents an especially important area for future inquiry.

Hardiness theory is rooted in the stress-illness relationship. It was originally developed to explain why some people were able to avoid illness even when exposed to high levels of stress over an extended period of time (Kobasa, 1979a, 1979b). As

discussed in the introduction, there are two major differences between the Kobasa and Nowack models. First, Nowack's model limits the scope of each component, providing a more targeted measure of the hardiness construct. This may help to explain the stronger correlations the CHS displays with measures relating to well-being and distress. Second, the CHS defines challenge differently, concentrating on sensation seeking as an index of an individual's tendency to live life to its fullest, whereas the Kobasa model concentrates on comfort with (or seeking out) change in search of interesting new experiences that will support personal growth.

The concept of physical thriving in response to stress (Epel, McEwan, & Ickovicks, 1998) provides an explanation for how cognitive appraisal styles could introduce a critical difference when predicting the development of illness symptoms. As described in the introduction, catabolic processes (destructive processes that allow for energy mobilization and rapid responses) are dominant during exposure to stressors. However, psychological thriving (and hence, physical thriving) is expected to occur only when anabolic (growth and renewal) processes predominate. Thus, thriving will not occur if there is insufficient time between stressors for the organism to recover and grow. In their ongoing quest for new and intense experiences, sensation seekers may not allow enough time between stressors to support growth processes.[18] Therefore, their developmental trajectory for physical functioning will remain stable (at best) rather than increasing. Just as a muscle that is strenuously exercised every day

[18] The CHS employs the Sensation Seeking Scale (Zuckerman & Link, 1968) to measure challenge.

without proper rest periods between will not grow stronger, sensation seekers may not allow their bodies enough time to rest and grow more resilient.[19]

Sample Composition

Gender. Findings from this study failed to provide evidence that gender moderates the relationship between hardiness and well-being, distress, or illness/injury. However, heterogeneity indices indicate that there may be differences in the amount of variability in effect sizes observed across studies for subjective well-being, with women showing greater consistency. One possible explanation is the presence of currently unidentified moderators that have a more powerful impact on men than women. Alternatively, the female samples may have been more homogeneous than the male samples in ways that are not readily identifiable from the limited information provided in the sample descriptions. Unfortunately, I was not able to test correlates from the work domain due to insufficient data. Additional research is needed to determine whether gender moderates the relationships between hardiness and correlates in the work domain.

Sample characteristics. Numerous authors have noted that there remains limited research examining relationships between hardiness and outcomes of interest among several sub-populations. While gender and occupation are the most frequently cited (and studied) characteristics, there are several other demographically-based

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[19] Alternatively, sensation seekers may expose themselves to danger more often and thus be more vulnerable to injury. However, most of the instruments used to assess the relationship between hardiness and illness focus on symptoms of disease (e.g., Seriousness of Illness Rating Scale) rather than injury, so danger-seeking seems like a less likely explanation.

subpopulations that remain understudied. Examples include individuals from various socioeconomic strata, the unemployed, people from diverse ethnic backgrounds, and individuals at different life stages such as adolescents, students, working adults, retirees or the elderly (Huang, 1995; C. Lambert & Lambert, 1999; Lindsey & Hills, 1992; Low, 1996; Orr & Westman, 1990; Ouellette, 1993; Parkes & Rendall, 1988). In conducting this review, I found there is still limited information available regarding these groups. Increased research in these areas would help to clarify the generalizability of the hardiness construct. Three areas that should be targeted in future studies include ethnicity, life stage, and occupation. Currently, there is almost no research investigating potential ethnic differences in hardiness and comparatively little research examining hardiness in samples that are not predominantly white. Areas of particular interest include SWB, psychological distress, and illness symptoms. Research involving participants from different life stages is more prevalent, but still not abundant. In particular, there has been limited research examining the relationships between hardiness and psychological distress or illness among older adults. Finally, occupation needs to be more thoroughly explored as a potential moderator. Although this topic has received more attention than most other sample characteristics, it still was necessary to aggregate very disparate occupational categories for several of the analyses conducted in this study. Given that unusually high levels of heterogeneity are prevalent throughout the hardiness literature, aggregating across dissimilar groups poses something of a problem as it can potentially add systematic variance (between-group variance) to an already high level of within-group heterogeneity. Consequently,

meaningful between-group differences may be difficult to detect. While none of the moderation tests for occupation conducted in this study were significant, there were relatively substantial differences between the estimated means for some of the subgroups. Thus, comparison of more homogeneous occupational groups would be desirable for correlates such as job satisfaction, psychological distress, burnout and illness.

Hardiness components. Analysis of the hardiness components suggest the presence of moderators or other unidentified sources of variability for each of the hardiness components. While testing several moderators for each of the three components was beyond the scope of this project, the results from this study suggest several issues that could be explored in future research. For example, study characteristics such as gender and life stage could be tested for each of the correlates in future meta-analyses. However, there are two areas of research that have the potential to be particularly informative: (1) examination of relationships of positive and negative dimensions of the hardiness components with correlates from various domains (e.g., physical health, psychological adjustment, well-being, distress, social support), and (2) comparison of patterns of relationships between the CHS components and hardiness correlates with components from the Kobasa model. Currently, there are very few studies employing the CHS that report component-correlate effect sizes and no studies have been published that report separate effect sizes for the positive and negative dimensions of each component.

Conclusion

Over the last three decades, the hardiness construct has inspired a large and diverse literature. Earlier reviews have focused more on the construct validity of hardiness as researchers have worked to establish its nomological network. Results of this meta-analysis suggest that a more focused approach may be more useful for future research. Although test results consistently showed significant relationships between hardiness and correlates relating to health and well-being, the variability in observed effect sizes was much greater than anticipated and there appear to be moderators in the relationships between hardiness and its correlates that require additional investigation.

Further theoretical development in two areas is also desirable. First, results of this analysis suggest that there remain content-oriented differences between hardiness instruments that need to be explored further. Although it was not possible to fully explore them, intriguing differences in the patterns of relationships between hardiness and its correlates for instruments developed under the Kobasa and Nowack models were noted in this study. Comparative studies identifying and evaluating the effects of differences in item content between the two models would be informative. Specifically, it appears that the Kobasa model could be more strongly related to physical health while the Nowack model may show stronger relationships with well-being. Careful analysis of the content domain for instruments from each theoretical model may help to clarify the reasons for these differences, particularly when combined with comparisons of item content for second versus third generation instruments. Empirical analyses could be employed to determine whether the observed

differences should be attributed to measurement issues or differences in the theory underlying each model.

The second area in need of further exploration and development may be even more important. As hardiness theory has progressed, several generations of instruments have been developed. However, only the fourth generation of hardiness instruments provide equal coverage of positive and negative hardiness domains. Initially, hardiness theorists assumed that each of the three hardiness dimensions consisted of a single bi-polar construct. Thus, negative items were assumed to tap one pole of the underlying construct while positive items were assumed to tap the other. More recently, researchers have recognized the importance of measuring both positive and negative aspects of hardiness. However, there are still few studies that report separate scores for positive and negative dimensions. Therefore, the relative importance of each domain and potential interactions between the two remain largely unexplored. This represents an especially important gap for the challenge component as it may help to explain its comparatively poor performance.

References

*Acosta. (1990). *The interrelationship of stressors, hardiness personality and social support on the severity of manifestations of stress symptoms among high-income men.* Unpublished Dissertation, University of Maryland - College Park.

*Alexander, D. A., & Klein, S. (2001). Ambulance personnel and critical incidents. *British Journal of Psychiatry, 178*, 76-81.

Alexander, F. (1984). Psychological aspects of medicine. *Advances, 1(2)*, 53-60.

Allred, K. D., & Smith, T. W. (1989). The hardy personality: Cognitive and physiological responses to evaluative threat. *Journal of Personality and Social Psychology, 56(2)*, 257-266.

Anderson, N. B., & Armstead, C. A. (1995). Toward understanding the association of socioeconomic status and health: A new challenge for the biopsychosocial approach. *Psychosomatic Medicine, 57(3)*, 213-225.

Antonovsky, A. (1985). The life cycle, mental health and the sense of coherence. *Israel Journal of Psychiatry and Related Sciences, 22(4)*, 273-280.

Antonovsky, H., & Sagy, S. (1986). The development of a sense of coherence and its impact on responses to stress situations. *Journal of Social Psychology, 126(2)*, 213-225.

*Aragones, A. O. (1999). *Burnout among doctoral-level psychologists: A study of coping alternatives.* Unpublished Dissertation, University of Detroit - Mercy, Michigan.

Aronson, K. R., Barrett, L. F., & Quigley, K. (2006). Emotional reactivity and the overreport of somatic symptoms: Somatic sensitivity or negative reporting style? *Journal of Psychosomatic Research, 60(5)*, 521-530.

*Arriola, K. R. J. (1998). *Suffering in silence: Racial discrimination and blood pressure among African Americans.* Unpublished Dissertation, Northeastern University.

Arthur, N. M. (1990). The assessment of burnout: A review of three inventories useful for research and counseling. *Journal of Counseling and Development, 69*, 186-189.

*Ayers, C. R. (2005). *Cognitive content and vulnerabilities to anxiety in later life.* Unpublished Dissertation, George Mason University, Fairfax, VA.

*Barry, B. A. (1989). *Hardiness as a mediator between stressors and life satisfaction in the elderly: A path analytic study.* Unpublished Dissertation, Hofstra University.

*Bartone, P. T. (1989). Predictors of stress-related illness in city bus drivers. *Journal of Occupational Medicine, 31(8)*, 657-663.

Bartone, P. T. (2000). Hardiness as a resiliency factor for United Sates forces in the Gulf War. In J. M. Violanti, D. Paton & et al. (Eds.), *Posttraumatic stress intervention: Challenges, issues, and perspectives* (pp. 115-133). Springfield, IL: Charles C. Thomas, Publisher Ltd.

Bartone, P. T., Ursano, R. J., Wright, K. M., & Ingraham, L. H. (1989). The impact of a military air disaster on the health of assistance workers: A prospective study. *Journal of Nervous and Mental Disease, 177(6)*, 317-328.

*Bausler, C. L. (1993). *The relationship between burnout and personality hardiness in nursing faculty.* Unpublished Dissertation, University of Missouri - Columbia

Beardslee, N. Q., White, N., & Richter, J. (1995). Strategies to decrease stress and enhance job satisfaction among nursing faculty. *College Student Journal, 29(4)*, 511-517.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.

Beck, A. T. (1991). Cognitive therapy: a 30-year retrospective. *American Psychologist, 46(4)*, 368-375.

Beck, A. T., & Clark, D. A. (1988). Anxiety and depression: An information processing perspective. *Anxiety Research, 1*, 23-36.

Beck, A. T., Brown, G., Steer, R. A., Eidelson, J. I., & Riskind, J. H. (1987). Differentiating anxiety and depression: A test of the cognitive content-specificity hypothesis. *Journal of Abnormal Psychology, 96(3)*, 179-183.

Beck, A. T., Wenzel, A., Riskind, J. H., Brown, G., & Steer, R. A. (2006). Specificity of hopelessness about resolving life problems: Another test of the cognitive model of depression. *Cognitive Therapy and Research, 30(6)*, 773-781.

Beck, R., Benedict, B., & Winkler, A. (2003). Depression and anxiety: Integrating the Tripartite and cognitive content-specificity assessment models. *Journal of Psychopathology and Behavioral Assessment, 25(4)*, 251-256.

*Benishek, L. A., & Lopez, F. G. (1997). Critical evaluation of hardiness theory: Gender differences, perception of life events, and neuroticism. *Work and Stress, 11(1)*, 33-45.

*Bennett, B. L., III. (1986). *A study of the impact of environmental stressors, stress coping resources, and psychological hardiness on job performance and health.* Unpublished Dissertation, Florida State University.

*Bennett, E. D. (1995). *Life events, hardiness, and prepartum depression in relationship to maternity blues and postpartum depression.* Unpublished Dissertation, University of Utah.

*Bernard, L. C., & Belinsky, D. (1993). Hardiness, stress, and maladjustment: Effects of self-reported retrospective health problems and prospective health center visits. *Journal of Social Behavior and Personality, 8(6)*, 97-110.

*Bernard, L. C., Hutchison, S., Lavin, A., & Pennington, P. (1996). Ego-strength, hardiness, self-esteem, self-efficacy, optimism, and maladjustment: Health-related personality constructs and the "Big Five" Model of personality. *Assessment, 3(2)*, 115-131.

*Berwick, K. R. K. (1992). Stress among student affairs administrators: The relationship of personal characteristics and organizational variables to work-related stress. *Journal of College Student Development, 33*, 11-19.

Blaney, N. T., & Ganellen, R. J. (1990). Hardiness and social support. In B. R. Sarason, I. G. Sarason & G. R. Pierce (Eds.), *Social support: An interactional view* (pp. 297-318). New York: John Wiley & Sons.

*Blaney, N. T., Goodkin, K., Morgan, R. O., Feaster, D., Millon, C., Szapocznik, J., et al. (1991). A stress-moderator model of distress in early HIV-1 infection: Concurrent analysis of life events, hardiness and social support. *Journal of Psychosomatic Research, 35(23)*, 297-305.

Blascovich, J., & Mendes, W. B. (2000). Challenge and threat appraisals: The role of affective cues. In J. P. Forgas (Ed.), *Feeling and thinking: The role of affect in social interaction* (2nd series, pp. 59-82). New York: Cambridge University Press.

*Boyle, A., Grap, M. J., Younger, J., & Thornby, D. (1991). Personality hardiness, ways of coping, social support and burnout in critical care nurses. *Journal of Advanced Nursing, 16*, 850-857.

Bradburn, N. M. (1969). *The structure of psychological well-being*. Chicago: Aldine.

*Bradbury, M. J. (1990). *Optimism, coping style, hardiness and anxiety, as mediators of response to a meaningful stressor.* Unpublished Dissertation, University of Miami.

*Brodnik, M. S. (1991). *Relationship of burnout to job-related stress, hardiness and selected organizational and socio-demographic characteristics among medical record department directors.* Unpublished Dissertation, Ohio State University.

*Brookings, J. B., & Bolton, B. (1997). A longitudinal, structural equation analysis of stress, hardiness, social support, depression, and illness. *Multivariate Experimental Clinical Research, 11(3)*, 109-120.

*Buran, C. F. (1993). *The relationship between hardiness and burnout in female nursing and liberal arts/science faculty.* Unpublished Dissertation, Indiana University School of Nursing.

Byrne, D. G. (2000). The frustration of success: Type A behavior, occupational stress, and cardiovascular disease. In D. T. Kenny, J. G. Carlson, F. J. McGuigan & J. L. Sheppard (Eds.), *Stress and health: Research and clinical applications*. Amsterdam, Netherlands: Harwood Academic Press.

*Campbell, V. L. (1987). *Hardiness, anger, stress, and illness in selected professional men.* Unpublished Dissertation, University of Missouri, Kansas City.

*Cantrell, K. K. (2007). *Predictors of quality of life of mothers with children with intellectual disabilities.* Unpublished Dissertation, University of Denver.

*Cencirulo, R. S. (2001). *The relationship between hardiness and job satisfaction in elementary school teachers.* Unpublished Dissertation, La Sierra University.

*Chan, D. W. (2003). Hardiness and its role in the stress-burnout relationship among prospective Chinese teachers in Hong Kong. *Teaching and Teacher Education, 19*, 381-395.

*Chew, L. K., Jr. (2001). *The relationship among hardiness, values, subjective well-being, and anxiety.* Unpublished Dissertation, Virginia Consortium for Professional Psychology (Old Dominion University).

Clark, D. A., Beck, A. T., & Stewart, B. (1990). Cognitive specificity and positive-negative affectivity: Complementary or contradictory views on anxiety and depression? *Journal of Abnormal Psychology, 99(2)*, 148-155.

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100(3)*, 316-336.

Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology, 100(1)*, 103-116.

*Clark, L. M., & Hartman, M. (1996). Effects of hardiness and appraisal on the psychological distress and physical health of caregivers to elderly relatives. *Research on Aging, 18(4)*, 379-401.

*Clark, P. C. (2002). Effects of individual and family hardiness on caregiver depression and fatigue. Research in Nursing Health, 25, 37-48.

*Clarke, B. M. (1991). *The burnout maze: An exploration of the interrelationships of burnout, hardiness, depression, response mode to burnout, and demographic variables.* Unpublished Thesis, University of Colorado, Graduate School of Public Affairs.

*Collins, M. A. (1996). The relation of work stress, hardiness, and burnout among full-time hospital staff nurses. *Journal of Nursing Staff Development, 12(2)*, 81-85.

*Compton, W. C. (1987). *Processing of self-relevant information as a predictor of hardiness.* Unpublished Dissertation, Vanderbuilt University.

Compton, W. C., Seeman, J., & Norris, R. C. (1991). Predicting hardiness: A search for the parameters of deep cognitive structures. *Medical Psychotherapy: An International Journal, 4*, 121-129.

Connolly, J. J., & Viswesvaran, C. (2000). The role of affectivity in job satisfaction: A meta-analysis. *Personality and Individual Differences, 29*, 265-281.

Constantini, A., Solano, L., Di Napoli, R., & Bosco, A. (1997). Relationship between hardiness and risk of burnout in a sample of 92 nurses working in oncology and AIDS wards. *Psychotherapy and Psychosomatics, 66(2)*, 78-82.

Costa, P. T., Jr., & McCrae, R. R. (1985). Hypochondriasis, neuroticism, and aging: When are somatic complaints unfounded? *American Psychologist, 40*, 19-28.

Costa, P. T., Jr., & McCrae, R. R. (1987). Neuroticism, somatic complaints, and disease: Is the bark worse than the bite? *Journal of Personality, 55*, 299-316.

Cox, T., & Ferguson, E. (1991). Individual differences, stress and coping. In C. L. Cooper & R. Payne (Eds.), *Personality and stress: Individual differences in the stress process* (pp. 7-30). New York: John Wiley & Sons.

*Daly-Barnes, D. (1989). *An analysis of burnout and hardiness in human service workers.* Unpublished Dissertation, Temple University, Pennsylvania.

*D'Ambrosia, S. J. (1986). *A study to examine if there is a relationship between burnout and hardiness of nurses working with oncology patients.* Unpublished Dissertation, Temple University, Pennsylvania.

*Darnall, B. D. (2002). *The relationship between athletic identity, elite athlete self-esteem, coping, and pathology in elite athletes.* Unpublished Dissertation, University of Colorado at Boulder.

*DeGenova, M. K. (1992). *The buffering effects of hardiness and coping on the stress-illness relationship in HIV-infected individuals.* Unpublished Dissertation, Purdue University, Indiana.

*Delmonico, L. J. (1997). *Stressful life events and resiliency: Coping responses, social support resources, hardiness, and perceived childhood family relationships in adult children of alcoholics.* Unpublished Dissertation, California School of Professional Psychology - San Diego.

*DePew, C. L., Gordon, M., Yoder, L. H., & Goodwin, C. W. (1999). The relationship of burnout, stress, and hardiness in nurses in a military medical center: A replicated descriptive study. *Journal of Burn Care and Rehabilitation, 20(6)*, 515-522.

*Dermatis, H. (1989). *Hardiness in nurses: Relation to stress, social support, coping, and illness.* Unpublished Dissertation, City University of New York.

Derogatis, L. R., & Cleary, P. A. (1977). Confirmation of the dimensional structure of the SCL-90: A study in construct validation. *Journal of Clinical Psychology, 33(4)*, 981-989.

Derogatis, L. R., Lipman, R. S., Rickels, K., Uhlenhuth, E. H., & Covi, L. (1974). The Hopkins Symptom Checklist (HSCL): A self-report symptom inventory. *Behavioral Science, 19*, 1-14.

Derry, P. A., & Kuiper, N. A. (1981). Schematic processing and self-reference in clinical depression. *Journal of Abnormal Psychology, 90(4)*, 286-297.

DeShon, R. P. (2003). A Generalizability Theory perspective on measurement error corrections in validity generalization. In K. R. Murphy (Ed.), *Validity generalization: A critical review* (pp. 365-402). Mahwah, NJ: Lawrence Erlbaum Associates.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95(3)*, 542-575.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1983). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49(1)*, 71-75.

*Domenici-Lake, P. L. (2002). *Biopsychosocial influences on female accompanying expatriate spouses' psychological well-being in Tokyo, Japan.* Unpublished Dissertation, University of Maryland, College Park.

Duquette, A., Kerouac, S., Sandhu, B. K., & Line, B. (1994). Factors relating to nursing burnout: A review of empirical knowledge. *Issues in Mental Health Nursing, 15(4)*, 337-358.

Eaker, E. D., Haynes, S. G., & Feinleib, M. (1983). Spouse behavior and coronary heart disease: Prospective results from the Framingham Heart Study. *Activas Nervosa Superior, 25(2)*, 81-90.

*Eid, J., Johnsen, B. H., Saus, E. R., & Risberg, J. (2004). Stress and coping in a week-long disabled submarine exercise. *Aviation, Space, and Environmental Medicine, 75(7, Section I)*, 616-621.

*Embry, J. (1992). *Control, commitment, and challenge: Relationships to stress, illness, and gender.* Unpublished Dissertation, University of North Texas, Denton, TX.

Emdad, R. (1998). Electrocortical signs of arousal in response to darkness and the assessment of Type A behavior in professional drivers with and without cardiovascular disease. *Integrative Physiological & Behavioral Science, 33(3)*, 227-248.

Epel, E. S., McEwen, B. S., & Ickovics, J. R. (1998). Embodying psychological thriving: Physical thriving in response to stress. *Journal of Social Issues, 54(2)*, 301-322.

Epstein, S., & Katz, L. (1992). Coping ability, stress, productive load, and symptoms. *Journal of Personality and Social Psychology, 62(5)*, 813-825.

*Evans, D. R., Pellizzari, J. R., Culbert, B. J., & Metzen, M. E. (1993). Personality, marital, and occupational factors associated with quality of life. *Journal of Clinical Psychology, 49(4)*, 477-485.

*Farber, E. W., Schwartz, J. A. J., Schaper, P. E., Moonen, D. J., & McDaniel, J. S. (2000). Resilience factors associated with adaptation to HIV disease. *Psychosomatics, 41(2)*, 140-146.

*Feldman, R. L. (1988). *An analysis of coping processes in high-risk pregnant women.* Unpublished Dissertation, City University of New York.

*Ferguson, L. J. (2004). *Coaching for hardiness: A study of women clergy and stress resistance.* Unpublished Dissertation, Adelphi University, The Institute of Advanced Psychological Studies, New York.

*Fisher, S. (1998). *Hardiness and job fitness for the intensive family preservation specialist: A correlational study.* Unpublished Dissertation, East Tennessee State University, Johnson City.

*Florian, V., Mikulincer, M., & Taubman, O. (1995). Does hardiness contribute to mental health during a stressful real-life situation? The roles of appraisal and coping. *Journal of Personality and Social Psychology, 68(4)*, 687-695.

Forgas, J. P., & George, J. M. (2001). Affective influences on judgments and behavior in organizations: An information processing perspective. *Organizational Behavior and Human Decision Processes, 86(1)*, 3-34.

Fredrikson, M., Wik, G., & Fischer, H. (1999). Higher hypothalamic and hippocampal neural activity in Type A than Type B women. *Personality and Individual Differences, 26(2)*, 265-270.

*Fullerton, C. S., Ursano, R. J., Kao, T. C., & Bharitya, V. R. (1999). Disaster-related bereavement: Acute symptoms and subsequent depression. *Aviation, Space, and Environmental Medicine, 70(9)*, 902-909.

Funk, S. C. (1992). Hardiness: A review of theory and research. *Health Psychology, 11(5)*, 335-345.

*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(3)*, 572-578.

*Fusco, P. S. (1994). *Hardiness, coping style, and burnout: Relationships in female hospital nurses.* Unpublished Dissertation, University of North Texas, Denton.

*Fusilier, M., & Manning, M. R. (2005). Psychosocial predictors of health status revisited. *Journal of Behavioral Medicine, 28(4)*, 347-358.

*Gale, B. J. (1990). *Well-being of elderly women: Rural-urban differences.* Unpublished Dissertation, University of San Diego, California.

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(1)*, 156-163.

Gentry, W. D., & Kobasa, S. C. (1984). Social and psychological resources mediating stress-illness relationships in humans. In W. D. Gentry (Ed.), *Handbook of behavioral medicine* (pp. 87-116). New York: The Guilford Press.

Gerhart, B. (1987). How important are dispositional factors as determinants of job satisfaction? Implications for job design and other personnel programs. *Journal of Applied Psychology, 72*, 366-373.

*Ghorbani, N., & Watson, P. J. (2005). Hardiness scales in Iranian Managers: Evidence of incremental validity in relationships with the Five Factor Model and with organizational and psychological adjustment. *Psychological Reports, 26*, 775-781.

*Ghorbani, N., Watson, P. J., & Morris, R. J. (2000). Personality, stress, and mental health: Evidence of relationships in a sample of Iranian managers. *Personality and Individual Differences, 28*, 647-657.

Ghorpade, J., Lackritz, J., & Singh, G. (2007). Burnout and personality: Evidence from academia. *Journal of Career Assessment, 15(2)*, 240-256.

*Gill, M. J., & Harris, S. L. (1991). Hardiness and social support as predictors of psychological discomfort in mothers of children with autism. *Journal of Autism and Developmental Disorders, 21(4)*, 407-416.

*Gill, W. J. (2001). *Stress and coping experiences of women in transition: From welfare to work.* Unpublished Dissertation, Old Dominion University, Virginia.

Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta analysis in social research.* Beverly Hills, CA: Sage.

*Gluhoski, V. L., Fishman, B., & Perry, S. W. (1997). Moderators of bereavement distress in a gay male sample *Personality and Individual Differences, 23(5)*, 761-767.

Goldstein, M. G., DePue, J., Kazura, A., & Niaura, R. (1998). Models for provider-patient interaction: Applications to health behavior change. In S. A. Shumaker, E. B. Schron, J. K. Ockene & W. L. McBee (Eds.), *The handbook of health behavior change* (2nd ed., pp. 85-113). New York: Springer Publishing Co.

*Gonzalez, M. A. (1997). *Study of the relationship of stress, burnout, hardiness, and social support in urban secondary school teachers.* Unpublished Dissertation, Temple University, Pennsylvania.

*Gramzow, R. H., Sedikides, C., Panter, A. T., & Insko, C. A. (2000). Aspects of self-regulation and self-structure as predictors of perceived emotional distress. *Personality and Social Psychology Bulletin, 26(2)*, 188-205.

Greenberg, M. S., & Beck, A. T. (1989). Depression versus anxiety: A test of the content specificity hypothesis. *Journal of Abnormal Psychology, 98(1)*, 9-13.

Greene, R. L., & Nowack, K. M. (1991). *Hardiness and health: Results of a 3-year longitudinal study.* Paper presented at the Annual Convention of the American Psychological Association, San Francisco, CA.

*Greene, R. L., & Nowack, K. M. (1995). Hassles, hardiness and absenteeism: Results of a 3-year longitudinal study. *Work and Stress, 9(4)*, 448-462.

Hahn, M. E. (1966). *California Life Goals Evaluation Schedule.* Palo Alto, CA: Western Psychological Services.

Hardiness Institute. (1985). *Personal Views Survey.* Arlington Heights, IL: Hardiness Institute.

*Heckman, C. J., & Clay, D. L. (2005). Hardiness, history of abuse, and women's health. *Journal of Health Psychology, 10(6)*, 767-777.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.

Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random-effects models in meta-analysis. *Psychological Methods, 3(4),* 486-504.

*Helrich, K. L. (1985). *The use of hardiness and other stress-resistance resources to predict symptoms and performance in police academy trainees.* Unpublished Dissertation, California School of Professional Psychology - San Diego.

Higgins, J. P. T., Thompson, s. G., Deeks, J. J., & Altman, D. G. (2006). Measuring inconsistency in meta-analysis. *British Medical Journal, 327(7414),* 557-560.

*Hirky, A. E. (1997). *Hardiness, social support, and coping among injection drug users.* Unpublished Dissertation, Yeshiva University, New York.

Hochwalder, J. (2006). An empirical exploration of the effect of personality on general and job-related mental ill health. *Social Behavior and Personality, 34(9)*, 1051-1070.

Holahan, C. J., & Moos, R. H. (1985). Life stress and health: Personality, coping, and family support in stress resistance. *Journal of Personality and Social Psychology, 49(3)*, 739-747.

*Holmes, D. N. (2004). *Age and responses to the events of September 11, 2001.* Unpublished Dissertation, University of North Texas.

*Horner, K. L. (1998). Individuality in vulnerability: Influences in physical health. *Journal of Health Psychology, 3(1)*, 71-85.

*Hotard, J. H. (1989). *Stress and coping in female single parents.* Unpublished Dissertation, University of South Florida.

Houston, B. K., & Snyder, C. R. (Eds.). (1988). *Type A behavior pattern: Research, theory, and intervention.* Oxford, England: John Wiley & Sons.

Huang, C. (1995). Hardiness and stress: A critical review. *Maternal-Child Nursing Journal, 23(3)*, 82-89.

Hulin, C. L., & Judge, T. A. (2003). Job attitudes. In W. C. Borman, D. R. Ilgen & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol. 12, pp. 255-276). Hoboken, NJ: John Wiley and Sons.

Hull, J. G., Van Treuren, R. R., & Propsom, P. M. (1988). Attributional style and the components of hardiness. *Personality and Social Psychology Bulletin, 14(3)*, 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(3)*, 518-530.

Hunter, J. E., & Schmidt, F. L. (1994). Correcting for sources of artificial variation across studies. In H. Cooper & L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 323-336). New York: Sage.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: correcting error and bias in research findings* (2nd ed.). Thousand Oaks, CA: Sage.

Iverson, R. D., Olekalns, M., & Erwin, P. J. (1998). Affectivity, organizational stressors, and absenteeism: A causal model of burnout and its consequences. *Journal of Vocational Behavior, 52*, 1-23.

Jackson, D. N. (1974). *Personality Research Form manual.* Goshen, NY: Research Psychologists Press.

*Jama, V. J. (1987). *The relationship between hardiness and burnout of professional nurses in the specialty of anesthesia.* Unpublished Dissertation, Wesleyan University, Connecticut.

*Jarvis, B. A. (1993). *A study of the relationship between teacher hardiness and job satisfaction at selected elementary schools.* Unpublished Dissertation, University of Central Florida.

Jennings, B. M., & Staggers, N. (1994). A critical analysis of hardiness. *Nursing Research, 43(5)*, 274-281.

*Jo, K. (2005). *A threefold relational approach to spiritual maturity: An exploratory study of Korean evangelical spirituality.* Unpublished Dissertation, Fuller Theological Seminary, School of Theology, Pasadena, California.

*Johns, B. R. (1998). *The relationship between personality hardiness and burnout among informal caregivers of people with HIV and AIDS.* Unpublished Dissertation, University of Cincinnati, Ohio.

*Johnson, B. W. (1989). *A prospective study of resistance resources in the life events stress and the stress-related disorders paradigm.* Unpublished Dissertation, University of Alabama.

Jones, J. W. (1980). *Staff Burnout Scale for Health Professionals*. Park Ridge, IL: London House.

*Josephson, R. L. (1988). *The mediating effects of social support and hardiness of personality on the life change events and menopausal symptoms of midlife women.* Unpublished Dissertation, California School of Professional Psychology, Los Angeles.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits -- self-esteem, generalized self-efficacy, locus of control, and emotional stability -- with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology, 86(1)*, 80-92.

Judge, T. A., & Larsen, R. J. (2001). Dispositional affect and job satisfaction: A review and theoretical extension. *Organizational Behavior and Human Decision Processes, 86(1),* 67-98.

Judge, T. A., & Locke, E. A. (1993). Effect of dysfunctional thought processes on subjective well-being and job satisfaction. *Journal of Applied Psychology, 78(3)*, 475-490.

*Judkins, S. K., & Rind, R. (2005). Hardiness, job satisfaction, and stress among home health nurses. *Home Heath Care Management and Practice, 17(2)*, 113-118.

Just, H. D. (1999). *Hardiness: Is it still a valid concept?* (ERIC Document Reproduction Service No. ED436704).

*Kafka-Tisdall, J. L. (2001). *The relationship between hardiness, college adjustment, and academic performance.* Unpublished Dissertation, Adler School of Professional Psychology, Illinois.

Kalaian, H. A., & Raudenbush, S. W. (1996). A multivariate mixed linear model for meta-analysis. *Psychological Methods, 1*, 227-235.

Kammann, R., & Flett, R. (1983). Affectometer 2: A scale to measure current level of general happiness. *Australian Journal of Psychology, 35*, 257-265.

*Kashubeck, S. (1994). Adult children of alcoholics and psychological distress. *Journal of Counseling & Development, 72*, 538-543.

*Kashubeck, S., & Christensen, S. A. (1992). Differences in distress among adult children of alcoholics. *Journal of Counseling Psychology, 39(3)*, 356-362.

*Kelley, B. C., Eklund, R. C., & Ritter-Taylor, M. (1999). Stress and burnout among collegiate tennis coaches. *Journal of Sport & Exercise Psychology, 21*, 113-130.

*Kelly, M. J. B. (1997). *The effect of work-related and personal demographic variables on burnout and hardiness in nurse managers.* Unpublished Master's Thesis, Clarkson College.

Keltikangas-Jarvinen, L. (2002). Psychology and the risk for cardiovascular disorder: A developmental perspective. In L. Backman & C. von Hofsten (Eds.), *Psychology at the turn of the millennium* (Vol. 1: Cognitive, biological, and health perspectives, pp. 335-353). Hove, England: Psychology Press/Taylor & Francis.

*Kennedy, J. F. (1988). *The relationship of hardiness, stress and job satisfaction in law enforcement officers.* Unpublished Dissertation, University of Houston, Texas.

Keyes, C. L. M., Shmotkin, D., & Ryff, C. D. (2002). Optimizing well-being: The empirical encounter of two traditions. *Journal of Personality and Social Psychology, 82(6)*, 1007-1022.

*Klagg, S., & Bradley, G. (2004). The role of hardiness in stress and illness: An exploration of the effect of negative affectivity and gender. *British Journal of Health Psychology, 9*, 137-161.

*Klement, E. C. (1988). *Stress and stress resistance resources among male dentists.* Unpublished Dissertation, University of Florida.

Kobasa, S. C. (1979a). Personality and resistance to illness. *American Journal of Community Psychology, 7(4)*, 413-423.

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

Kobasa, S. C. (1982). The hardy personality: Toward a social psychology of stress and health. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illness* (pp. 3-32). Hillsdale, NJ: Lawrence Erlbaum Associates.

Kobasa, S. C. (1985). Barriers to work stress II: The hardy personality. In W. D. Gentry, H. Benson & C. J. de Wolff (Eds.), *Behavioral medicine: Work, stress, and health* (pp. 181-204). Dordrecht/Boston/Lancaster: Martinus Nijhoff Publishers.

Kobasa, S. C. (1987). Stress responses and personality. In R. C. Barnett & L. Biener (Eds.), *Gender and Stress*. New York: The Free Press.

Kobasa, S. C., & Maddi, S. R. (1982). *Hardiness measurement.* Unpublished manuscript.

Kobasa, S. C., Maddi, S. R., & Courington, S. (1981). Personality and constitution as mediators in the stress-illness relationship. *Journal of Health and Social Behavior, 22*, 368-378.

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology, 42(1)*, 168-177.

Kobasa, S. C., Maddi, S. R., & Zola, M. A. (1983). Type A and hardiness. *Journal of Behavioral Medicine, 6(1)*, 41-51.

*Kobasa, S. C., & Puccetti, M. C. (1983). Personality and social resources in stress resistance. *Journal of Personality and Social Psychology, 45(4)*, 839-850.

*Koch, D. E. (1998). *Narratives of growth and transformation among adult college students: The role of hardiness within a larger social context.* Unpublished Dissertation, City University of New York.

*Korotkov, D., & Hannah, T. E. (1994). Extraversion and emotionality as proposed superordinate stress moderators: A prospective analysis. *Personality and Individual Differences, 16(5)*, 787-792.

*Kravetz, S., Drory, Y., & Florian, V. (1993). Hardiness and sense of coherence and their relation to negative affect. *European Journal of Personality, 7*, 233-244.

Lachman, V. D. (1996). Stress and self-care revisited: A literature review. *Holistic Nursing Practice, 10(2)*, 1-12.

Lambert, C. E. Jr., & Lambert, V. A. (1999). Psychological hardiness: State of the science. *Holistic Nursing Practice, 13(3)*, 11-19.

Lambert, V. A., & Lambert, C. E., Jr. (1987). Hardiness: Its development and relevance to nursing. *IMAGE: Journal of Nursing Scholarship, 19(2)*, 92-95.

*Lambert, V. A., Lambert, C. E., Jr., Petrini, M., Li, X. M., & Zhang, Y. J. (2007). Workplace and personal factors associated with physical and mental health in hospital nurses in China. *Nursing and Health Sciences, 9*, 120-126.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*, 159-174.

Langelaan, S., Bakker, A. B., van Doornen, L. J. P., & Schaufeli, W. B. (2006). Burnout and work engagement: Do individual differences make a difference? *Personality and Individual Differences, 40*, 521-532.

*Langemo, D. K. (1990). Impact of work stress on female nurse educators. *Journal of Nursing Scholarship, 22(3)*, 159-162.

*Laudet, A. B. (1991). *The role of psychological factors in recovery from an injury: Hardiness, optimism and attributions.* Unpublished Dissertation, New School for Social Research, New York.

*Law, D. W. (2003). *An examination of personality traits as moderating factors of exhaustion in public accounting.* Unpublished Dissertation, Washington State University.

Lawler, K. A., Kline, K. A., Harriman, H. L., & Kelly, K. M. (1999). Stress and illness. In V. J. Derlega & B. A. Winstead (Eds.), *Personality: Contemporary theory and research* (2nd ed., pp. 489-513). Chicago, IL: Nelson-Hall Publishers.

*Layman, E. (1996). *The relationships among psychological type, hardiness, coping mechanisms, and burnout in directors of hospital health information management departments.* Unpublished Dissertation, Georgia State University.

Lazarus, R. S., & Folkman, S. F. (1984). *Stress, appraisal, and coping.* New York, NY: Springer Publishing Company.

*Lee, H. C. J. (1991). Relationship of hardiness and current life events to perceived health in rural adults. *Research in Nursing & Health, 14*, 351-359.

*Lee, K. V. (2002). *A two-wave panel study of the relationships among hardiness, acculturation, stress, and psychological distress in Chinese Americans.* Unpublished Dissertation, University of California, Davis.

Leiter, M. P., & Maslach, C. (2001). Burnout and health. In A. Baum, T. A. Revenson & J. E. Singer (Eds.), *Handbook of health psychology* (pp. 415-426). Mahwah, NJ: Lawrence Erlbaum Associates.

*Leo, M. C., Sinclair, R. R., & Banas, C. (n.d.). The effects of hardiness on stress, strain, and academic performance. Unpublished manuscript.

Lightsey, W. R. J. (1996). What leads to wellness? The role of psychological resources in well-being. *Counseling Psychologist, 24(4)*, 589-759.

*Lindberg, M. A. (2002). The role of suggestions and personality characteristics in producing illness reports and desires for suing the responsible party. *The Journal of Psychology, 136(2)*, 125-140.

Lindsey, E., & Hills, M. (1992). An analysis of the concept of hardiness. *The Canadian Journal of Nursing Research, 24(1)*, 39-50.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis* (Vol. 49). Thousand Oaks, CA: Sage.

*Littell, S. C. (1995). *Organizational climate and job satisfaction in mid-level nurse managers.* Unpublished Dissertation, The University of Texas at Austin.

Littman, A. B. (1998). A review of psychosomatic aspects of cardiovascular disease. In G. A. Fava & H. Freyberger (Eds.), *Handbook of psychosomatic medicine* (pp. 261-293). Madison, CT: International Universities Press, Inc.

*Lopez, J. M. O., Santiago, M. J., Goas, A., Castro, C., Villardefrancos, E., & Ponte, D. (2008). An integrative approach to burnout in secondary school teachers: Examining the role of student disruptive behaviour and disciplinary issues. *International Journal of Psychology and Psychological Therapy, 8(2)*, 259-270.

Low, J. (1996). The concept of hardiness: A brief but critical commentary. *Journal of Advanced Nursing, 24*, 588-590.

*Luszczynska, A., & Cieslak, R. (2005). Protective, promotive, and buffering effects of perceived social support in managerial stress: The moderating role of personality. *Anxiety, Stress, and Coping, 18(3)*, 227-244.

Maddi, S. R. (1987). Hardiness training at Illinois Bell Telephone. In J. P. Opatz (Ed.), *Health promotion evaluation: Measuring the organizational impact* (pp. 101-115). Stevens Point, WI: National Wellness Institute.

Maddi, S. R. (1998). Hardiness. In E. A. Blechman & K. D. Brownell (Eds.), *Behavioral medicine and women: A comprehensive handbook.* New York: The Guilford Press.

*Maddi, S. R. (1999). The personality construct of hardiness I: Effect on experiencing, coping, and strain. *Consulting Psychology Journal: Practice and Research, 51(2)*, 83-94.

Maddi, S. R. (2002). The story of hardiness: Twenty years of theorizing, research, and practice. *Consulting Psychology Journal: Practice and Research, 54(3)*, 175-185.

*Maddi, S. R., Harvey, R. H., Khoshaba, D. M., Lu, J. L., Persico, M., & Brow, M. (2006). The personality construct of hardiness, III: Relationships with repression, innovativeness, authoritarianism, and performance. *Journal of Personality, 74(2)*, 575-597.

Maddi, S. R., & Hightower, M. (1999). Hardiness and optimism as expressed in coping patterns. *Consulting Psychology Journal: Practice and Research, 51(2)*, 95-105.

Maddi, S. R., Kahn, S., & Maddi, K. L. (1998). The effectiveness of hardiness training. *Consulting Psychology Journal: Practice and Research, 50(2)*, 78-86.

*Maddi, S. R., & Khoshaba, D. M. (1994). Hardiness and mental health. *Journal of Personality Assessment, 63(2)*, 265-274.

*Maddi, S. R., Khoshaba, D. M., Persico, M., Lu, J., Harvey, R., & Bleecker, F. (2002). The personality construct of hardiness: II. Relationships with comprehensive tests of personality and psychopathology. *Journal of Research in Personality, 36*, 72-85.

Maddi, S. R., & Kobasa, S. C. (1984). *The hardy executive: Health under stress.* Chicago, IL: Dorsey Professional Books.

Maddi, S. R., Kobasa, S. C., & Hoover, M. (1979). An alienation test. *Journal of Humanistic Psychology, 19*, 73-75.

*Magnani, L. E. (1990). Hardiness, self-perceived health, and activity among independently functioning older adults. *Scholarly Inquiry for Nursing Practice: An International Journal, 4(3)*, 171-184.

*Manning, M. R., & Fusilier, M. R. (1999). The relationship between stress and health care use: An investigation of the buffering roles of personality, social support and exercise. *Journal of Psychosomatic Research, 47(2)*, 159-173.

*Manning, M. R., Williams, R. F., & Wolfe, D. M. (1988). Hardiness and the relationship between stressors and outcomes. *Work & Stress, 2(3)*, 205-216.

*Marsh, V. (1997). *Job stress and burnout among nurses: The mediational effect of spiritual well-being and hardiness.* Unpublished Dissertation, Texas Woman's University.

*Martin, J. J., Kelley, B., & Eklund, R. C. (1999). A model of stress and burnout in male high school athletic directors. *Journal of Sport an Exercise Psychology, 21*, 280-294.

*Martin-Neuckermans, A. M. J. (1994). *The relation of childhood sexual abuse and current hardiness to health behaviors in women.* Unpublished Dissertation, California School of Professional Psychology - Berkeley/Alameda.

Maslach, C. (1997). Maslach Burnout Inventory. In C. P. Zalaquett & R. J. Wood (Eds.), *Evaluating stress: A book of resources* (3rd ed., pp. 191-218). Lanham, MD: Scarecrow Education.

Maslach, C. (2001). What have we learned about burnout and health? *Psychology and Health, 16*, 607-611.

Maslach, C., Schaufeli, W. B., & Leiter, M. (2001). Job burnout. *Annual Review of Psychology, 53*, 397-422.

*Mastalerz, L. H. (2000). *The dynamics of burnout in Catholic elementary principals.* Unpublished Dissertation, Roosevelt University, Illinois.

Matarazzo, J. D. (1984). Behavioral immunogens and pathogens in health and illness. In B. L. Hammonds & C. J. Scheirer (Eds.), *Psychology and health* (pp. 9-43). Washington, DC: American Psychological Association.

*Mathis, M., & Lecci, L. (1999). Hardiness and college adjustment: Identifying students in need of services. *Journal of College Student Development, 20(3)*, 305-309.

*McCalister, K. T., Dolbier, C. L., Webster, J. A., Mallon, M. W., & Steinhardt, M. A. (2006). Hardiness and support at work as predictors of work stress and job satisfaction. *American Journal of Health Promotion, 20(3)*, 183-191.

*McCranie, E. W., Lambert, V. A., & Lambert, C. E., Jr. (1987). Work stress, hardiness, and burnout among hospital staff nurses. *Nursing Research, 26(6)*, 374-378.

*McNeil, K., Kozma, A., Stones, M. J., & Hannah, E. (1986). Measurement of psychological hardiness in older adults. *Canadian Journal on Aging, 5(1)*, 43-48.

Mearns, J., & Cain, J. E. (2003). Relationships between teachers' occupational stress and their burnout and distress: Roles of coping and negative mood regulation expectancies. *Anxiety, Stress, and Coping, 16(1)*, 71-82.

Mills, L. J. (2000). *Evaluation of a model of hardiness and health using meta-analysis and path analysis.* Unpublished Dissertation, University of Tulsa.

*Mirzadeh, S. A. (1999). *The role of hardiness and perceptions of social support in the early college adjustment of international students.* Unpublished Dissertation, Michigan State University.

Moorman, R. H. (1993). The influence of cognitive and affective based job satisfaction measures on the relationship between satisfaction and organizational citizenship behavior. *Human Relations, 46(6)*, 759-776.

*Morelock, D. F. (1994). *A correlational study of hardiness, health, and burnout among teachers in the Sullivan County School System.* Unpublished Dissertation, East Tennessee State University.

*Nelson, N. D. (1988). *Hardiness, ego development, and successful aging in the elderly.* Unpublished Dissertation, University of Houston, Texas.

*Neria, Y., Guttmann-Steinmetz, S., Koenen, K., Levinovsky, L., Zakin, G., & Dekel, R. (2001). Do attachment and hardiness relate to each other and to mental health in real-life stress? *Journal of Social and Personal Relationships, 18(6)*, 844-858.

Neugarten, B. L., Havighurst, R. J., & Tobin, S. S. (1961). The measurement of life satisfaction. *Journal of Gerontology, 16*, 134-143.

Nowack, K. M. (1985). The relationship between stress, cognitive hardiness, and health coping behavior to psychological well-being. Unpublished Dissertation, University of California - Los Angeles.

*Nowack, K. M. (1986). Type A, hardiness, and psychological distress. *Journal of Behavioral Medicine, 9(6)*, 537-548.

*Nowack, K. M. (1989). Coping style, cognitive hardiness, and health status. *Journal of Behavioral Medicine, 12(2)*, 145-158.

*Nowack, K. M. (1990). Initial development of an inventory to assess stress and health risk. *American Journal of Health Promotion, 4(3)*, 173-180.

*Nowack, K. M. (1991). Psychosocial predictors of health status. *Work & Stress, 5(2)*, 117-131.

*Nowack, K. M., & Hanson, A. L. (1983). The relationship between stress, job performance, and burnout in college student resident assistants. *Journal of College Student Personnel, 24(6)*, 545-550.

*Nunley, B. L. (2002). *Stress, hardiness, and psychological distress of elderly spousal caregivers of persons with dementia.* Unpublished Dissertation, University of Kentucky, College of Nursing, Lexington, KY.

*Okun, M. A., Zautra, A. J., & Robinson, S. E. (1988). Hardiness and health among women with rheumatoid arthritis. *Personality and Individual Differences, 9(1)*, 101-107.

Oliver, C. M. (2005). *Are there multiple hardiness profiles? Exploring the relationships between hardiness configurations and coping, cohesion, military attachment, and soldier well-being.* Unpublished Thesis. Portland State University.

*Oman, R. F., & Oman, K. K. (2003). A case-control study of psychosocial and aerobic exercise factors in women with symptoms of depression. *The Journal of Psychology, 137(4)*, 338-350.

Orr, E., & Westman, M. (1990). Does hardiness moderate stress, and how? A review. In M. Rosenbaum (Ed.), *Learned resourcefulness: on coping skills, self-control, and adaptive behavior* (pp. 64-94). New York: Springer Publishing Company.

Orwin, R. (1983). A fail-safe *N* for effect size in meta-analysis. *Journal of Educational Statistics, 8,* 157-159.

Ouellette, S. C. (1993). Inquiries into hardiness. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: Theoretical and clinical aspects* (2nd ed., pp. 77-100). New York: The Free Press.

Overton, R. C. (1998). A comparison of fixed-effects and mixed (random effects) models for meta-analysis tests of moderator variable effects. *Psychological Methods, 3*, 354-379.

Parkes, K. R., & Rendall, K. (1988). The hardy personality and its relationship to extraversion and neuroticism. *Personality and Individual Differences, 9(4)*, 785-790.

*Patusky, K. L. (1999). *Event-generated dependence and its psychological sequelae in older adults.* Unpublished Dissertation, University of Michigan.

*Paulik, K. (2001). Hardiness, optimism, self-confidence and occupational stress among university teachers. *Studia Psychologica, 43(2)*, 91-100.

*Pengilly, J. W., & Dowd, E. T. (2000). Hardiness and social support as moderators of stress. *Journal of Clinical Psychology, 56(6)*, 813-820.

Pennebaker, J. W. (1982). *The psychology of physical symptoms.* New York: Springer-Verlag.

*Perez, A. M. (1998). *Migration and mental health among Dominican immigrants living in New York City: A comparison of two migration-mental health models.* Unpublished Dissertation, Fordham University, New York.

*Pierce, C. M. B., & Molloy, G. N. (1990). Psychological and biographical differences between secondary school teachers experiencing high and low levels of burnout. *British Journal of Psychology, 60(1)*, 37-51.

Pines, A. M. (1993). Burnout. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: Theoretical and clinical aspects* (pp. 386-402). New York: The Free Press.

Pines, A. M., Aronson, E., & Kafry, D. (1981). *Burnout: From tedium to personal growth.* New York: Free Press.

*Pollachek, J. B. (2001). *The relationship of hardiness, social support, and health promoting behaviors to well-being in chronic illness.* Unpublished Dissertation, Rutgers - the State University of New Jersey, Newark.

Rahe, R. H., Meyer, M., Smith, M., Kjaer, G., & Holmes, T. H. (1964). Social stress and illness onset. *Journal of Psychosomatic Research, 8(1)*, 35-44.

*Rahim, M. A. (1990). Moderating effects of hardiness and social support on the relationships of conflict and stress to job burnout and performance. In M. A. Rahim (Ed.), *Theory and research in conflict management* (pp. 4-14). New York: Praeger Publishers.

Raudenbush, S. W. (1994). Random effects models. In H. Cooper & L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 301-321). New York: Russell Sage Foundation.

Rebollo, I., & Boomsa, D. I. (2006). Genetic and environmental influences on Type A behavior pattern: Evidence from twins and their parents in the Netherlands Twin Register. *Psychosomatic Medicine, 68(3)*, 437-442.

*Rhodes, R. S. (1994). *The mediating effect of hardiness on stress as it relates to preventive health behaviors and quality of life in older adults.* Unpublished Dissertation, Louisiana State University Health Sciences Center School of Nursing.

Rhodewalt, F., & Agustdottir, 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(1)*, 81-88.

*Rice, M. (1997). *The effects of a structured hardiness training intervention program for stress on university women.* Unpublished Dissertation, Brigham Young University, Utah.

*Rich, V. L., & Rich, A., R. (1987). Personality hardiness and burnout in female staff nurses. *IMAGE: Journal of Nursing Scholarship, 19*(2), 63-66.

Riskind, J. H. (1997). Looming vulnerability to threat: A cognitive paradigm for anxiety. *Behavior Research and Therapy, 35(8)*, 685-702.

Riskind, J. H., & Alloy, L. B. (2006). Cognitive vulnerability to psychological disorders: Overview of theory, design, and methods. *Journal of Social and Clinical Psychology, 25(7)*, 705-725.

Riskind, J. H., & Williams, N. L. (2005). The looming cognitive style and generalized anxiety disorder: Distinctive danger schemas and cognitive phenomenology. *Cognitive Therapy and Research, 29(1)*, 7-27.

Riskind, J. H., Williams, N. L., Gessner, T. L., Chrosniak, L. D., & Cortina, J. M. (2000). The looming maladaptive style: anxiety, danger, and schematic processing. *Journal of Personality and Social Psychology, 79*(5), 837-852.

Riskind, J. H., Williams, N. L., & Joiner, T. E., Jr. (2006). The looming cognitive style: A cognitive vulnerability for anxiety disorders. *Journal of Social and Clinical Psychology, 25(7)*, 779-801.

*Robitschek, C., & Kashubeck, S. (1999). A structural model of parental alcoholism, family functioning, and psychological health: The mediating effects if hardiness and personal growth orientation. *Journal of Counseling Psychology, 46(2)*, 159-172.

*Rosen, L. N., Wright, K. M., Marlowe, D., Bartone, P. T., & Gifford, R. K. (1999). Gender differences in subjective distress attributable to anticipation of combat among U.S. Army soldiers deployed to the Persian Gulf during Operation Desert Storm. *Military Medicine, 164(11)*, 753-757.

Rosenthal, R. (1979). The "file drawer problem" and tolerance for null results. *Psychological Bulletin, 86,* 638-641.

Rosenthal, R. (1991). *Meta-analytic procedures for social research* (Revised ed. Vol. 6). Thousand Oaks, CA: Sage.

Rosmalen, J. G. M., Neeleman, J., Gans, R. O. B., & de Jonge, P. (2007). The association between neuroticism and self-reported common somatic symptoms in a population cohort. *Journal of Psychosomatic Research, 62(3)*, 305-311.

*Roth, D. L., Wiebe, D. J., Fillingim, R. B., & Shay, K. A. (1989). Life events, fitness, hardiness, and health: A simultaneous analysis of proposed stress-resistance effects. *Journal of Personality and Social Psychology, 57(1)*, 136-142.

Rotter, J. B., Seeman, M., & Liverant, S. (1962). Internal vs. external locus of control of reinforcement: A major variable in behavior theory. In N. F. Washburne (Ed.), *Decisions, values, and groups* (pp. 473-516). London: Pergamon.

*Rowe, M. M. (1997). Hardiness, stress, temperament, coping, and burnout in health professionals. *American Journal of Health Behavior, 21(3)*, 163-171.

*Rowe, M. M. (1998). Hardiness as a stress mediating factor of burnout among healthcare providers. *American Journal of Health Studies, 14(1)*, 16-20.

*Rush, M. C., Schoel, W. A., & Barnard, S. M. (1995). Psychological resiliency in the public sector: "Hardiness and pressure for change". *Journal of Vocational Behavior, 46*, 17-39.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57(6)*, 1069-1081.

Salovey, P., Rothman, A. J., & Rodin, J. (1998). Health behavior. In D. T. Gilbert & S. T. Fiske (Eds.), *The handbook of social psychology* (4th ed., Vol. 2, pp. 633-683). New Haven, CT: Yale University Press.

*Schafer, W. E., & McKenna, J. F. (1991). Perceived energy and stress resistance: A study of city managers. *Journal of Social Behavior and Personality, 6(2)*, 271-282.

*Schmied, L. A., & Lawler, K. A. (1986). Hardiness, Type A behavior, and the stress-illness relation in working women. *Journal of Personality and Social Psychology, 51(6)*, 1218-1223.

*Schoenig, T. M. (1987). *An investigation of the relationships among burnout, hardiness, stressful teaching events, job and personal characteristics in public school teachers.* Unpublished Dissertation, Hofstra University.

*Sciacchitano, M., Goldstein, M. B., & DiPlacido, J. (2001). Stress, burnout and hardiness in R.T.s. *Radiologic Technology, 72(4)*, 321-328.

*Sears, S. F., Jr., & McKillop, K. J., Jr. (1990). *Hopelessness and Hardiness: A Strained Relationship*. Paper presented at the Annual Meeting of the Southeastern Psychological Association, Atlanta, GA.

Senge, P. M. (1990). *The Fifth discipline: The art and practice of the learning organization.* New York: Currency Doubleday.

*Sewell, M. C. (1997). *Hope and resilience among women with AIDS.* Unpublished Dissertation, New York University.

*Shapiro, S. H. (1987). *Determinants of job satisfaction among athletic trainers: The relationship between academic program factors and job factors, personal factors, and hardiness personality.* Unpublished Dissertation, University of Virginia.

*Sharpley, C. F., & Yardley, P. (1999). The relationship between cognitive hardiness, explanatory style, and depression-happiness in post-retirement men and women. *Australian Psychologist, 34(3)*, 198-203.

*Simoni, P. A. S., & Paterson, J. J. (1997). Hardiness, coping, and burnout in the nursing workplace. *Journal of Professional Nursing, 13(3)*, 178-185.

*Sims, K. M. E. (2000). *Hardiness and spiritual well-being as moderators of burnout in professional nurses.* Unpublished Dissertation, George Fox University.

*Sinclair, R. R., & Oliver, C. M. (2003). *Development and validation of a short measure of hardiness*. Silver Springs, MD: Unpublished technical report prepared for Walter Reed Army Institute of Research.

*Sinclair, R. R., Oliver, C. M., Ippolito, J., & Ascalon, E. (2003). *Development and Validation of the DRS-II: A Dual-Process Measure of Hardiness*. Unpublished manuscript.

Sinclair, R. R., & Sears, L. (2007). *Developing the Personal Resilience Scale.* Unpublished manuscript.

*Sinclair, R. R., & Tetrick, L. E. (2000). Implications of item wording for hardiness structure, relation with neuroticism, and stress buffering. *Journal of Research in Personality, 34(1)*, 1-25.

Sinclair, R. R., & Tucker, J. S. (2006). Stress-CARE: An integrated model of individual differences in Soldier performance under stress. In T. W. Britt, C. A. Castro & A. B. Adler (Eds.), *Military life: The psychology of serving in peace and combat* (Vol. 1: Military performance, pp. 202-231). Westport, CT: Praeger Security International.

*Skau, M. (2002). *Hardiness as a predictor of coping and internship satisfaction among predoctoral interns.* Unpublished Dissertation, University at Albany, State University of New York.

*Skirka, N. (2000). The relationship of hardiness, sense of coherence, sports participation, and gender to perceived stress and psychological symptoms

among college students. *Journal of Sports Medicine and Physical Fitness, 40(1)*, 63-70.

*Sladeczek, I. E. (1993). *Hardiness, social support, depression, and behavioral repertoire.* Unpublished Dissertation, University of Arizona.

*Smith, J. V. (1995). *Hardiness, appraisal and coping styles in freshman university students.* Unpublished Dissertation, University of Wyoming.

*Smith, T. J. (1991). *Hardiness and other predictors of life satisfaction in noninstitutionalized rural older adults.* Unpublished Dissertation, University of Texas at Austin.

*Smith, T. L., & Meyers, L. S. (1997). The sense of coherence: its relationship to personality, stress, and health measures. *Journal of Social Behavior and Personality, 12(2)*, 513-526.

*Smochek, M. R. (1992). *Hardiness: Its relationship to health and burnout in undergraduate nursing students.* Unpublished Dissertation, Widener University School of Nursing, Pennsylvania.

*Soderstrom, M., Dolbier, C. L., Leiferman, J., & Steinhardt, M. A. (2000). The relationship of hardiness, coping strategies, and perceived stress to symptoms of illness. *Journal of Behavioral Medicine, 23(1)*, 311-327.

*Spampneto, A. M. (1996). *The relationship among hardiness, stressful life events, and psychological health for adult males and females.* Unpublished Dissertation, University of New Orleans, Louisiana.

*Spradling, G. M. (2000). *In moderating effect of hardiness on the relationship between marital stress and satisfaction in older adults.* Unpublished Dissertation, California School of Professional Psychology - Berkeley/Alameda.

Staw, B. M. (2004). The dispositional approach to job attitudes: An empirical and conceptual review. In B. Schneider & D. B. Smith (Eds.), *Personality and organizations* (pp. 163-191). Mahwah, NJ: Lawrence Erlbaum Associates.

Staw, B. M., & Ross, J. (1985). Stability in the midst of change: A dispositional approach to job attitudes. *Journal of Applied Psychology, 70*, 469-480.

Staw, B. M., Bell, N. E., & Clausen, J. A. (1986). The dispositional approach to job attitudes: A lifetime longitudinal test. *Administrative Science Quarterly, 31*, 56-77.

Steel, R. P., & Rentsch, J. R. (1997). The dispositional model of job attitudes revisited: Findings of a 10-year study. *Journal of Applied Psychology, 82*, 873-879.

*Steinhardt, M. A., Dolbier, C. L., Gottlieb, N. H., & McCalister, K. T. (2003). The relationship between hardiness, supervisor support, group cohesion, and job stress as predictors of job satisfaction. *American Journal of Health Promotion, 17(6)*, 382-389.

Steptoe, A. (1990). Psychobiological stress responses. In M. Johnston & L. Wallace (Eds.), *Stress and medical procedures* (pp. 3-24). New York: Oxford University Press.

*Stokes-Crowe, L. A. (1998). *Hardiness, one of several personality constructs thought to affect health.* Unpublished Dissertation, University of Cincinnati, Ohio.

*Sullivan, G. C. (1987). *Hardiness and the sense of coherence as moderators of the stress-illness relationship.* Unpublished Dissertation, Boston University, Boston, MA.

*Sussman, G. M. (2001). *Hardiness, coping, and distress among caregivers of institutionalized Alzheimer's patients.* Unpublished Dissertation, Pepperdine University, California.

*Taft, C. T., Stern, A. S., King, L. A., & King, D. W. (1999). Modeling physical health and functional health status: The role of combat exposure, posttraumatic stress disorder, and personal resource attributes. *Journal of Traumatic Stress, 12(1)*, 3-23.

*Tang, T. L., & Hammontree, M. L. (1992). The effects of hardiness, police stress, and life stress on police officers' illness and absenteeism. *Public Personnel Management, 21(4)*, 493-510.

Tartasky, D. S. (1993). Hardiness: Conceptual and methodological issues. *IMAGE: Journal of Nursing Scholarship, 25(3)*, 225-229.

Taylor, S. E., & Aspinwall, L. G. (1996). Mediating and moderating processes in psychosocial stress: Appraisal, coping, resistance, and vulnerability. In H. B.

Kaplan (Ed.), *Psychosocial stress: Perspectives on structure, theory, life-course, and methods* (pp. 71-110). San Diego, CA: Academic Press.

Thoresen, C. J., Kaplan, S. A., Barsky, A. P., de Chermont, K., & Warren, C. R. (2003). The affective underpinnings of job perceptions and attitudes: A meta analytic review and integration. *Psychological Bulletin, 129*(6), 914-945.

Tokar, D. M., Fischer, A. R., & Subich, L. M. (1998). Personality and vocational behavior: A selective review of the literature, 1993-1997. *Journal of Vocational Behavior, 53*, 115-153.

Tomaka, J., Blascovich, J., Kelsey, R. M., & Leitten, C. I. (1993). Subjective, physiological, and behavioral effects of threat and challenge appraisal. *Journal of Personality and Social Psychology, 65*(2), 248-260.

*Topf, M. (1989). Personality hardiness, occupational stress, and burnout in critical care curses. *Research in Nursing & Health, 12*, 179-186.

Underwood, B., & Froming, W. J. (1980). The Mood Survey: A personality measure of happy and sad moods. *Journal of Personality Assessment, 44(4)*, 404-414.

van der Linden, D., Taris, T. W., Beckers, D. G. J., & Kindt, K. B. (2007). Reinforcement sensitivity theory and occupational health: BAS and BIS on the job. *Personality and Individual Differences, 42*, 1127-1138.

*Van Servellen, G., Topf, M., & Leake, B. (1994). Personality hardiness, work-related stress, and health in hospital nurses. *Hospital Topics, 72(2)*, 34-39.

*Venkatachalam, M. (1995). *Personal hardiness and perceived organizational support as links in the role stress-outcome relationship: A person-environment fit model.* Unpublished Dissertation, University of Alabama.

*Voyce, J. A. (1996). *An investigation of the relationships among attributional style, hardiness, gender, and depression as predictors of coping with real life events by chemically dependent inpatients.* Unpublished Dissertation, University of Missouri - Kansas City.

Wagnild, G., & Young, H. M. (1991). Another look at hardiness. *IMAGE: Journal of Nursing Scholarship, 23(4)*, 257-259.

*Wallace, K. A. (2003). An examination of hardiness in male older adults living in a rural setting. In S. P. Shohov (Ed.), *Advances in Psychology Research* (Vol. 23, pp. 78-94). Hauppauge, New York: Nova Science Publishers.

Ware, J. E., Kosinski, M., & Keller, S. D. (1994). *SF-36 physical and mental health summary scales: A user's manual.* Boston: Medical Outcomes Trust.

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review, 96(2)*, 234-254.

Watson, D., Clark, L. A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology, 97(3)*, 346-353.

Watson, D., Weber, K., Assenheimer, J. S., Clark, L. A., Straus, M. E., & McCormick, R. A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology, 104(1)*, 3-14.

*Weissman, T. D. (2003). *Male gender role conflict and hardiness: Looking for health in American men.* Unpublished Dissertation, University of Houston, Texas.

*Wells, D. L. (1987). *Modifiers of occupational stress outcomes for Iowa farmers. (Volumes I and II).* Unpublished Dissertation, Iowa State University.

Westman, M. (1990). The relationship between stress and performance: The moderating effect of hardiness. *Human Performance, 3(3)*, 141-155.

Whiteman, M. C., Deary, I. J., & Fowkes, F. G. R. (2000). Personality and health: Cardiovascular disease. In S. E. Hampson (Ed.), *Advances in personality psychology* (Vol. 1, pp. 157-198). New York: Psychology Press.

*Wiebe, D. J. (1988). *The role of hardiness in moderating the impact of stress.* Unpublished Dissertation, The University of Alabama at Birmingham.

Wiebe, D. J. (1991). Hardiness and stress moderation: A test of proposed mechanisms. *Journal of Personality and Social Psychology, 60(1)*, 89-99.

*Wiebe, D. J., & McCallum, D. M. (1986). Health practices and hardiness as mediators in the stress-illness relationship. *Health Psychology, 5(5)*, 425-438.

Wiebe, D. J., & Williams, P. G. (1992). Hardiness and health: A social psychophysiological perspective on stress and adaptation. *Journal of Social and Clinical Psychology, 11*(3), 238-262.

*Wilder, B. F. (1995). *The relationship of selected demographic characteristics, health conditions, and personality hardiness with quality of life in older adults.* Unpublished Dissertation, University of Alabama at Birmingham.

*Williams, D. M., & Lawler, K. A. (2003). Importance of macro social structures and personality hardiness to the stress-illness relationship in low-income women. *Journal of Human Behavior in the Social Environment, 7(3/4)*, 121-140.

Williams, R. B., Barefoot, J. C., & Schneiderman, N. (2003). Psychosocial risk factors for cardiovascular disease: More than one culprit at work. *JAMA: Journal of the American Medical Association, 290(16)*, 2190-2192.

*Williams, S. J. (1990). The relationship among stress, hardiness, sense of coherence, and illness in critical care nurses. *Medical Psychotheraphy, 3*, 171-186.

Wilson, D. B. (n.d.). Meta-analysis stuff. Retrieved April 7, 2008, from http://mason.gmu.edu/~dwilsonb/ma.html

*Wright, T. F., Blache, C. F., Ralph, J., & Luterman, A. (1993). Hardiness, stress, and burnout among intensive care nurses. *Journal of Burn Care & Rehabilitation, 14(3)*, 376-381.

Wyler, A. R., Masuda, M., & Holmes, T. H. (1968). Seriousness of Illness Rating Scale. *Journal of Psychosomatic Research, 11*, 336-374.

*Yoshimura, E. C. (1991). *Illness risk and resistance as a function of codependency, differentiation of self, hardiness, and stress.* Unpublished Dissertation, Arizona State University.

Younkin, S. L., & Betz, N. E. (1996). Psychological hardiness: A reconceptualization and measurement. In T. W. Miller (Ed.), *Theory and assessment of stressful life events* (pp. 161-178). Madison, CT: International Universities Press.

Zuckerman, M., & Link, K. (1968). Construct validity for the Sensation-Seeking Scale. *Journal of Consulting and Clinical Psychology, 32(4)*, 420-426.

APPENDIX A: CALCULATING MEAN EFFECT SIZES

Fixed Effects Model

(1) All effect sizes must be converted into correlation coefficients.

(2) Most methodologists (e.g., Hedges & Olkin, 1985; Lipsey & Wilson, 2001; Rosenthal, 1991), recommend applying Fisher's z_r transformation to the correlation coefficients. This transformation normalizes the distribution of r and stabilizes the variance, thus eliminating problems with the formula for the standard error.

   a. Fisher's z_r transformation formula: $z_r = 0.5\ln[(1 + r)/(1 - r)]$

(3) Each transformed correlation coefficient is then multiplied by its inverse variance weight (w). According to Wilson (n.d.), Hedges has demonstrated that the optimal weights for meta-analyses are $1/SE^2$ (the reciprocal of the square of the standard error).

   a. For z_r transformed correlation coefficients, $SE = \sqrt{(1/n - 3)}$, thus $w = n - 3$. Per Hedges and Olkin , the asymptotic variance $1/(n - 3)$ provides a more accurate approximation to the z_r-distribution for moderate values of n than the variance $1/n$.

(4) To obtain a weighted mean effect size, which serves as the population estimate (ρ) for the relationship between hardiness and the correlate in question, the following formula is applied: Mean $z_r = \Sigma(w*z_r)/\Sigma w$.

(5) Next, the standard error of the mean z_r is computed using the formula $SE_{MeanZr} = \sqrt{(1/\Sigma w)}$.

(6) Finally, a 95% confidence interval is computed: Mean$z_r \pm 1.96(SE_{MeanZr})$.

Once the mean z_r and the 95% confidence intervals have been established for each relationship, homogeneity analysis tests can be conducted, if indicated.

Homogeneity Analysis Testing

(1) The following formula is used to calculate Q for each mean effect size:

$Q = \Sigma(w * z_r^2) - [\Sigma(w * z_r)]^2/\Sigma w$

a. The Q-statistic is distributed as a χ^2 with *d.f.* = number of effect sizes (correlations) – 1.

b. *Note:* This is a fixed effects model.

(2) If Q-test results are significant, studies are grouped according to their status on the moderator variable. Separate Q-test statistics are generated for each subsample/group. These Q-test statistics are then entered into an ANOVA analog where the sum of the subsample Q-statistics becomes the within group data (Q_{Within}) and the Q-statistic from the combined test represents the Q_{Total}. $Q_{Between}$ is computed by subtracting Q_{Within} from Q_{Total}. Degrees of freedom are equal to the total number of effect sizes minus in number of groups. In equation format:

a. $Q_{\text{Within}} = Q_{\text{Group1}} + Q_{\text{Group2}} \ldots Q_{\text{GroupK}}$, and $df = k - j$, where k is the number of effect sizes and j is the number of groups.

b. $Q_{Between} = Q_{Ttotal} - Q_{Within}$, and $df = j - 1$, where j is the number of groups.

(3) Once Q_{Within}, $Q_{Between}$, and Q_{Total} have been calculated, each Q-value is compared with the critical value on an F-distribution. Typically, alpha < .05 is used to determine significance. A significant within-group Q-value indicates there is still heterogeneity within subgroups and additional examination is needed to identify additional (or different) moderators. On the other hand, if the within-group Q-value is not significant, mean effect sizes (correlations) and confidence intervals should be calculated for each group.

Calculating Effect Sizes Under the Random and Mixed Effects Models

Random Effects Model

In contrast to the fixed effects model, the random effects model assumes that the observed variability in effect sizes represents a combination of sampling error and variability in the population of effects. Thus, when calculating w_i, (the weight for each study) a constant is added to the inverse of the sampling variance. In equation form, this equates to: $w_i = 1/(SE^2 + vhat_\theta)$ where $vhat_\theta$ represents the random effects variance component. The random effects variance component is based upon Q and can be computed using this formula: $vhat_\theta = (Q_{Total} - k - 1)/(\Sigma w - (\Sigma w^2/\Sigma w))$. Once the random effects variance component has been computed, it can be added to the variance associated with each effect size (calculated previously in the process of the fixed effects analysis). The mean effects size analysis can then be conducted using the new weight.

Mixed Effects Model

The mixed effect model is a specific type of random effects model. Like the fixed effects model, it assumes the presence of systematic between-study variability. However, it also assumes that both subject-level and study-level error variance are present. As with the random effects model, once the estimate for the random effects variance component is computed ($vhat_{\theta}$) and added to the standard error variance associated with each effect size, the inverse variance weights are recalculated and the analysis is rerun with the new weights. However, under the mixed effects model, $vhat_{\theta}$ is based on the residual variability rather than the total variability (Q_{Within} rather than Q_{Total}). Because matrix algebra is required to calculate the value for the random variance component under the mixed effects model, use of a computer program such as that supplied by Wilson (http://mason.gmu.edu/~dwilsonb/ma.html) is recommended.

APPENDIX B: STUDY DESCRIPTIONS

Table A1
Descriptive Information for Meta-Analysis Studies (part 1 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Acosta, S. Y. (1990)	114	0	High income males (professionals and managers)	PVS	Distress (general)	Operationalized as the amount of distress caused (or anticipated) due to experiencing somatic symptoms (7 subscales of symptoms)
Alexander, D. A., Klein, S. (2001)	110	14	Scottish emergency personnel (ambulance)	DRS	Distress (general) Burnout	*Distress:* General Health Questionnaire *Burnout:* Maslach Burnout Inventory
Aragones, A. O. (2001)	175	56	Licensed, doctoral level psychologists	PVS	Burnout	Maslach Burnout Inventory
Arriola, K. R. J. (1998)	71	100	African American women	PVS II	Well-being (cognitive)	Two-item measure designed to capture global quality of life perceptions
Arriola, K. R. J. (1998)	44	0	African American men	PVS II	Well-being (cognitive)	Two-item measure designed to capture global quality of life perceptions

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 2 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Ayers, C. R. (2005)	169	67	Older adults (combination of community dwelling and individuals residing in continuing residential care facilities)	CHS	Illness (medical) Distress (anxiety, general)	*Illness:* Medical Conditions Checklist (50 items, listing general medical conditions) *Anxiety:* Adult Manifest Anxiety Scale - Elderly Version *Distress:* Clinical Assessment Scales for the Elderly - Short Form (screening for a number of Axis I disorders)
Barry, B. A. (1989)	150	79	Elderly residents of a retirement community	UHS	Well-being (cognitive)	Life Satisfaction in the Elderly Scale (40-items)
Bartone, P. T. (1989)	912	18	Bus drivers	DRS	Illness (medical)	Combination of 35 items from the Seriousness of Illness Rating Scale and the somatic complaints subscale of the Hopkins Symptoms Checklist
Bausler, C. L. (1993)	113	100	Female nursing faculty	UHS	Burnout	Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 3 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Benishek, L.A., Lopez, F.G. (1997)	91	0	Male university employees (wide range of occupations)	RHS	Illness (medical)	Seriousness of Illness Rating Scale
Benishek, L.A., Lopez, F.G. (1997)	85	100	Female university employees (wide range of occupations)	RHS	Illness (medical)	Seriousness of Illness Rating Scale
Bennett, B., III (1985)	114	95	Nurses	RHS	Physical health	Health and Daily Living Form (HDL) assesses health-related functioning in a wide variety of domains
Bennett, E. D. (1995)	63	100	Primiparous pregnant women	PVS	Distress (depression)	Beck Depression Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 4 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Bernard, L. C., Belinsky, D. (1993)	229	60	College students	PVS	Distress (general, depression) Illness (medical)	*Distress:* College Maladjustment Scale from the MMPI-2 *Depression:* Beck Depression Inventory *Illness:* Self-reported health problems assessed through the Probes on New Health Problems questionnaire
Bernard, L.C., Hutchinson, S., Lavin, A., Pennington, P. (1996)	134	66	Combination of college students and non-college students between the ages of 30 & 50	PVS	Distress (general)	College Maladjustment Scale from the MMPI-2
Bernard, L. C., Hutchinson, S., Lavin, A., Pennington, P. (1996)	264	66	Combination of college students and non-college students between the ages of 30 and 50	PVS	Distress (general)	College Maladjustment Scale from the MMPI-2
Bernard, L. C., Hutchinson, S., Lavin, A., Pennington, P. (1996)	191	56	Combination of college students and non-college students between the ages of 30 and 50	PVS	Illness (medical)	Seriousness of Illness Rating Scale (SIRS)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 5 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Berwick, K. R. (1992)	240	45	Student affairs administrators	PVS	Burnout Job satisfaction	*Burnout:* Maslach Burnout Inventory (MBI) *Job Satisfaction:* Spectrum: Higher Education (assesses degree of overall satisfaction and person-job fit)
Blaney, N. T., Goodkin, K., Morgan, R. O., Feaster, D., Millon, C., Szapocznik, J. S., Eisdorfer, C., (1991)	67	0	Asymptomatic HIV+ gay males	PVS	Distress (general)	Composite scores from four of the subscales (depression, tension/anxiety, fatigue, and confusion) from the Profile of Mood States (POMS) with the Dysthymia scale from the Millon Clinical Multitaxial Inventory-II (MCMI-II)
Boyle, A., Grap, M. J., Younger, J., Thornby, D., (1991)	103	unk	Nurses	UHS	Burnout	Staff Burnout Scale for Health Professionals

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 6 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Bradbury, M. J. (1990)	60	58	Graduating law students	PVS	Distress (depression) Illness (somatic)	*Depression:* Beck Depression Inventory *Illness*: Somatization subscale from the Hopkins Symptom Checklist
Brodnik, M. S. (1991)	505	unk	Medical Record Department Directors (middle managers)	PVS	Burnout	Maslach Burnout Inventory
Brookings, J., Bolton, B. (1997)	133	66	College students	RHS	Distress (depression) Illness (medical)	*Depression:* Center for Epidemiological Studies Depression Scale (CES-D) *Illness:* Seriousness of Illness Rating Scale
Buran, C. F. (1993)	121	100	Full-time female School of Nursing faculty	PVS	Burnout	Maslach Burnout Inventory
Campbell, V. L. (1987)	170	0	Professional men (lawyers and managers)	PVS	Illness (medical)	Seriousness of Illness Rating Scale
Cencirulo, R. S. (2001)	218	88	Elementary school teachers	PVS III-R	Job satisfaction	Mendenhall's Job Satisfaction Survey

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 7 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Cantrell, K. K. (2007)	71	100	Mothers of children with intellectual disabilities	PVS III-R	Well-being (cognitive)	Comprehensive Quality of Life-5; assesses QoL across 5 dimensions: objective, importance, satisfaction, and subjective, overall
Chan, D. W. (2003)	83	unk	Prospective teachers after completion of a short teaching internship	Study specific	Burnout	Maslach Burnout Inventory
Chew, L. K., Jr. (2001)	145	86	College students	DRS	Well-being (cognitive)	Satisfaction with Life Scale (SWLS)
Clark, L. M., Hartman, M. (1996)	53	68	Caretakers for elderly relatives	PVS	Distress (general) Illness (medical)	Distress: Composite of scores from the Beck Depression Inventory (BDI) and the single item Delighted-Terrible Rating *Illness:* Medical Conditions and Physical Symptoms subscales from the Health and Daily Living Form (HDL) - Adult Form B

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 8 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Clark, P. C. (2002)	67	91	Caregivers for impaired older adults	DRS	Distress (depression)	Center for Epidemiological Studies Depression Scale (CES-D)
Clarke, B. M. (1991)	158	94	Nurses	PVS	Burnout Distress (depression)	Burnout: Maslach Burnout Inventory (MBI) Depression: Beck Depression Inventory (BDI)
Collins, M. A. (1996)	113	unk	Nurses	PVS	Burnout	Tedium Burnout Scale
Compton, W. C. (1987)	115	78	College students	RHS	Distress (depression)	Beck Depression Inventory (BDI)
Daly-Barnes, D. (1989)	182	63	Client care workers (human services)	PVS II	Burnout	Maslach Burnout Inventory (MBI)
D'Ambrosia, S. J. (1986)	121	96	Nurses	UHS	Burnout	Staff Burnout Scale for Health Professionals (SBS-HP)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 9 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Darnall, B. D. (2002)	214	41	Elite athletes (runners and cyclists identified through U.S. Track & Field and USA Cycling)	CHS	Distress (depression)	Center for Epidemiological Studies Depression Scale (CES-D)
Degenova, M. K. (1993)	83	0	HIV+ males	PVS	Distress (depression) Illness (medical)	Depression: Center for Epidemiological Studies Depression Scale (CES-D) *Illness:* Instrument developed for study; 15-item measure assesses physical problems associated with having HIV
Delmonico, L. J. (1997)	202	63	Adult children of alcoholics recruited from a community sample	PVS II	Distress (depression)	Global Depression Index

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 10 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Eid, J., Johnsen, B. J., Saus, E., Risberg, J. (2004)	18	0	Norwegian Naval officers and crew	DRS	Distress (general)	General Health Questionnaire (GHQ-12)
Embry, J. (1992)	75	0	Male college students	UHS	Distress (general) Illness (medical)	*Distress:* Hopkins Symptoms Checklist (HSCL) *Illness:* Seriousness of Illness Rating Scale
Embry, J. (1992)	75	100	Female college students	UHS	Distress (general) Illness (medical)	*Distress:* Hopkins Symptoms Checklist (HSCL) *Illness:* Seriousness of Illness Rating Scale
Evans, D. R., Pellizzari, J. R., Culbert, B. J., Metzen, M. E. (1993)	128	51	London, Ontario residents	AHS	Well-being (cognitive)	Quality of Life Questionnaire (assesses QoL across 15 dimensions)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 11 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Farber, E. W., Schwartz, J. A., Schaper, P. E., Moonen, D. J., McDaniel, J. S. (2000)	200	27	Symptomatic individuals with HIV or AIDS	DRS	Distress (general) Physical health	Medical Outcomes Study HIV Health Survey (30-item measure developed from the MOS General Health Survey for use with persons with HIV/AIDS)
Feldman, R. L. (1988)	61	100	Pregnant women who had experienced premature labor	Study specific	Distress (general)	Hopkins Symptom Checklist
Ferguson, L. J. (2004)	47	100	Clergywomen	PVS III-R	Distress (anxiety, depression)	Derogatis Stress Profile: Depression and Anxiety subscales
Fisher, S. (1998)	52	69	Intensive Family Preservation Services counselors	PVS	Burnout Job satisfaction	*Burnout:* Maslach Burnout Inventory *Job Satisfaction:* Job-in-General subscale from the JDI

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 12 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Florian, V., Mikulincer, M., Taubman, O. (1995)	276	0	18-year old males beginning a term of military service compulsory for all Israeli men	PVS	Well-being (cognitive) Distress (general)	Mental Health Inventory: Multidimensional questionnaire assessing two bipolar factors: perceptions of general well-being and psychological distress
Fullerton, C. S., Ursano, R. J., Kao, T. C., Bharitya, V. R. (1999)	71	4	Members of a U.S. Air Force squadron members who had lost 7 members plane crash on a routine training mission	DRS	Distress (depression)	Depression subscale from the Symptoms Checklist-90 (SCL-90)
Funk, S.C., Houston, K. (1987)	118	0	Male college students	UHS	Distress (general)	College Maladjustment Scale from the MMPI-2
Fusco, P. S. (1994)	101	100	Female nurses	PVS	Burnout	Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 13 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Fusilier, M., Manning, M. R. (2005)	260	unk	Employees from two organizations: a manufacturing company and an insurance company	UHS	Burnout Illness/injury (medical)	*Burnout:* Maslach Burnout Inventory (MBI) *Illness/injury:* Frequency of contact with healthcare providers assessed through total number of health insurance claims submitted during a two-year period
Gale, B. J. (1990)	110	100	Elderly women (half rural, half urban)	PVS	Illness/injury (medical)	Sickness Impact Profile (assesses level of dysfunction)
Ghorbani, N., Watson, P. J. (2005)	159	0	Male Iranian managers	PVS II	Job satisfaction	Intrinsic job satisfaction: measures satisfaction with employment circumstances
Ghorbani, N., Watson, P. J., Morris, R. J. (2000)	94	0	Male Iranian managers	PVS	Distress (general, anxiety, depression) Illness (somatic)	General Health Questionnaire (GHQ-28); correlations for overall general psychological distress scores as well as anxiety, depression, and somatic complaints subscales reported

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 14 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Gill, M. J., Harris, S. L. (1991)	60	100	Mothers of children with autism	PVS	Illness (medical)	Malaise Inventory (assesses somatic and health-related complaints)
Gluhoski, V. L., Fishman, B., Perry, S. W. (1997)	598	0	Gay men	PVS	Distress (depression, general)	*Depression:* Beck Depression Inventory *Distress:* Brief Symptom Inventory
Gonzalez, M. A. (1997)	104	53	High school teachers	PVS	Burnout	Maslach Burnout Inventory
Gramzow, R. H., Sedikides, C., Panter, A. T., Insko, C. A. (2000)	199	67	College students	PVS	Distress (depression)	Dejection-related items from the Beck Depression Inventory, the Zung Self-Rating Depression Scale, and the Center for Epidemiological Studies Depression Scale
Greene, R. L., Nowack, K. M. (1995)	229	31	Police officers	CHS	Well-being (cognitive) Illness/injury (medical)	*Well-being:* 12-item scale assessing overall satisfaction with work and life *Illness/injury:* Absenteeism due to illness; assessed through use of sick time; verified through medical personnel records over a 3-year period

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 15 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Heckman, C. J., Clay, D. L. (2005)	201	100	Outpatients from a gynecology clinic (some seeking annual exams and others exhibited specific complaints)	DRS	Well-being (combination) Distress (general) Physical health Illness (medical)	*Well-being and psychological distress:* Mental Health Inventory (multidimensional questionnaire containing two factors: perceptions of general well-being and psychological distress *Health:* Physical component of the Short Form Health Survey (SF-36) *Illness:* Cohen-Hoberman Inventory of Physical Symptoms (CHIPS)
Helrich, K. L. (1985)	106	25	Police academy trainees	UHS	Distress (depression, anxiety) Illness (medical)	Distress and illness assessed with the Adult Health and Daily Living (HDL) Form B. *Distress* was measured with the Depressed Mood and Anxiety subscales; *illness* assessed through the Physical Symptoms and Medical Conditions indices

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 16 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Hirky, A. E. (1997)	101	40	Injection drug users enrolled in a methadone maintenance treatment program	DRS	Distress (depression, anxiety)	*Depression:* Center for Epidemiological Studies Depression Scale (CES-D) *Anxiety:* Zung Self-Rating Anxiety Scale
Holmes, D. N. (2004)	403	69	College students	PVS	Distress (general)	Hopkins Symptom Checklist
Horner, K. L. (1998)	284	54	College students	PVS	Illness (medical)	*Illness:* Seriousness of Illness Rating Scale
Hotard, J. H. (1989)	141	100	Head of household single mothers who work full time	UHS	Distress (general)	Global Severity Index from the Brief Symptom Inventory
Hull, J. G., Van Treuren, R. R., Virnelli, S. (1987)	138	unk	College students	RHS	Distress (depression)	Beck Depression Inventory
Hull, J. G., Van Treuren, R. R., Virnelli, S. (1987)	131	unk	College students	RHS	Distress (depression)	Beck Depression Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 17 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Hull, J. G., Van Treuren, R. R., Virnelli, S. (1987)	134	unk	College students	RHS	Distress (depression)	Beck Depression Inventory
Jama, V. J. (1987)	100	65	Certified Registered Nurse Anesthetists (CRNAs)	UHS	Burnout	Staff Burnout Scale for Health Professionals
Jarvis, B. A. (1993)	325	93	Elementary school teachers	PVS	Job satisfaction	Minnesota Satisfaction Questionnaire
Jo, K. (2005)	110	73	Korean Protestant Christians	DRS	Well-being (cognitive)	Satisfaction with Life Scale
Johns, B. R. (1998)	30	43	Caregivers for HIV/AIDS infected individuals	PVS	Burnout	Tedium Burnout Scale
Johnson, B. W. (1989)	209	81	College students	UHS	Illness (medical)	Seriousness of Illness Rating Scale
Josephson, R. L. (1988)	84	100	Female teachers	RHS	Distress (general, anxiety, depression)	Overall scores on the Brief Symptom Inventory, as well as Anxiety and Depression subscales

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 18 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Judkins, S., Rind, R. (2005)	94	94	Nurses	DRS	Job satisfaction	Mueller-McClosky Job Satisfaction Scale
Kafka-Tisdall, J. K. (2001)	185	65	College students	PVS III-R	Distress (depression, anxiety)	Depression and Anxiety subscales from the College Adjustment Scale
Kashubeck, S. (1994)	228	72	College students	PVS	Distress (general)	Brief Symptom Inventory (BSI)
Kashubeck, S., Christiansen, S. A. (1992)	67	67	College students who are adult children of alcoholics	PVS	Distress (general)	Brief Symptom Inventory (BSI)
Kashubeck, S., Christiansen, S. A. (1992)	79	67	Volunteers from a 12-step support group for adult children of alcoholics	PVS	Distress (general)	Brief Symptom Inventory (BSI)
Kelley, B. C., Eklund, R. C., Ritter-Taylor, M. (1999)	265	37	Collegiate head tennis coaches	CHS	Burnout	Maslach Burnout Inventory (MBI)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 19 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Kelly, M. J. B. (1997)	116	97	Nurse managers	Dane's Hardi Survey	Burnout	Maslach Burnout Inventory (MBI)
Kennedy, J. F. (1988)	173	0	Male police officers	RHS	Job satisfaction	Index of Organizational Reactions (assesses 7 dimensions of job satisfaction as well as overall satisfaction)
Klagg, S., Bradley, G. (2004)	50	0	Random sample of male employees in an Australian university	DRS	Distress (anxiety) Illness (medical)	*Distress:* Tension-Anxiety scale from the Profile of Mood States (POMS) *Illness:* Modified version of Ruffin's Symptom Checklist
Klagg, S., Bradley, G. (2004)	80	100	Random sample of female employees in an Australian university	DRS	Distress (anxiety) Illness (medical)	*Distress:* Tension-Anxiety scale from the Profile of Mood States (POMS) *Illness:* Modified version of Ruffin's Symptom Checklist

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 20 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Klement, E. C. (1988)	251	0	Male dentists	PVS	Well-being (cognitive) Distress (general)	*Well-being:* Index of Well-Being *Distress:* Strain Questionnaire (assesses physical, behavioral, and cognitive symptoms arising from exposure to environmental demands/stressors)
Kobasa, S. C. O., Puccetti, M. C. (1983)	170	0	Business executives (middle and upper managers at a utility company)	UHS	Illness (medical)	Seriousness of Illness Rating Scale
Koch, D. E. (1998)	245	5	College students	PVS	Distress (general)	Psychiatric Epidemiology Research Inventory - Demoralization scale
Korotkov, D., Hannah, T. E. (1994)	714	67	College students	AHS	Illness (medical)	Modified (shortened) version of the Cohen-Hoberman Inventory of Physical Symptoms

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 21 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Kravetz, S., Drory, Y., Florian, V. (1993)	164	0	Male coronary heart disease patients	PVS	Distress (depression)	Beck Depression Inventory
Lambert, V. A., Lambert, C. E., Petrini, M., Li, X. M., Zhang, Y. J. (2007)	480	99	Chinese nurses	PVS	Distress (general) Physical health	*Distress:* Mental health related items (e.g., emotional problems subscale) from the SF-36 *Health:* Physical health related items from the SF-36
Langemo, D. K. (1990)	287	100	Nurse educators	PVS	Burnout	Maslach Burnout Inventory - Form Ed (MBI-Ed)
Laudet, A. B. (1991)	51	37	Hospitalized accident victims	RHS	Illness/injury (medical)	Adjusted length of hospital stay, holding severity of injury and previous health status constant
Law, D. W. (2003)	88	48	Public accountants	DRS	Burnout	Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 22 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Layman, E. (1996)	286	98	Credentialed directors of hospital health information management departments	PVS	Burnout	Maslach Burnout Inventory
Lee, H. J. (1991)	162	17	Rural adults who are members of a state agricultural organizations (i.e., mostly farmers, all employed)	AHS	Subjective well-being (cognitive and affective) Physical health	*Cognitive SWB:* Index of Well-Being (assesses satisfaction across several different life domains) *Affective SWB:* Bradburn & Caplovitz's Affect Balance Scale *Physical health:* Ware's 32-item Health Perception Scale
Lee, K. V. (2002)	912	100	Female Chinese Americans (primarily first generation immigrants)	Study specific	Distress (general)	Symptom Checklist-90

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 23 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Lee, K. V. (2002)	835	0	Male Chinese Americans (primarily first generation immigrants)	Study specific	Distress (general)	Symptom Checklist-90
Leo, M. C., Sinclair, R. R., Banas, C. (nd)	201	53	College students	Study specific	Distress (anxiety, depression) Illness (somatic)	Strain scale consisting of three dimensions (Anxiety, Depression, and Somatic Complaints), each assessed through a 5-item subscale
Lindberg, M. A. (2002)	92	76	College students	PVS	Distress (anxiety) Illness (somatic)	*Anxiety:* 9-items from the Costello-Comrey Anxiety Scale *Illness:* Pennebaker Inventory of Limbic Languidness
Littell, S. C. (1995)	281	91	Mid-level nurse managers	PVS	Job satisfaction	Nurse Job Satisfaction Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 24 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Lopez, J. M., Santiago, M. J., Godas, A., Castro, C., Villardefrancoes, E., Ponte, D. (2008)	1,386	59	Spanish secondary school teachers	PVS	Burnout	Maslach Burnout Inventory (MBI-Ed)
Luszczynska, A., Cieslak, R. (2005)	221	0	Male middle and lower level managers	Study specific	Job satisfaction	
Maddi, S. R. (1999)	140	unk	Managers at a utility	PVS II	Distress (general, anxiety, depression) Illness (somatic)	*Distress:* Overall score on the Hopkins Symptom Checklist (HSCL) *Anxiety and Depression:* Anxiety and Depression subscales of the HSCL *Illness:* Somatic complaints subscale from the HSCL

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 25 of 48)

Author (Year)	N	% Female	Sample Description	Hardiness Measure	Correlates	*Assessments*
Maddi, S. R., Harvey, R. H., Khoshaba, D. M., Lu, J. L., Persico, M., Brow, M. (2006)	1,239	61	Combination of college students and working adults	PVS III-R	Distress (general)	Symptom Checklist-90
Maddi, S. R., Khoshaba, D. M. (1994)	158	unk	College students	PVS	Distress (general, anxiety, depression)	*Distress:* Hopkins Symptoms Checklist *Anxiety and Depression* scales from the MMPI
Maddi, S. R., Khoshaba, D. M., Perisco, M., Lu, J., Harvey, R., Bleecker, F. (2002)	69	65	Working adults recruited through human resource professionals	PVS II	Distress (anxiety, depression)	Anxiety Disorder and Major Depression scales from the Millon Clinical Multitaxial Inventory III (MCMI-III)
Magnani, L. E. (1990)	115	74	Non-institutionalized older adults living in an urban environment	RHS	Physical health	Self-Health Assessment (global measure of health perceptions among older adults)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 26 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Manning, M. R., Fusilier, M. R. (1999)	192	66	Employees at a small manufacturing plant and a large insurance company	UHS	Illness/injury (medical)	Contact with healthcare personnel assessed through health insurance claim history over a two year period
Manning, M. R., Williams, R. F., Wolfe, D. M. (1988)	468	65	Employees at a small manufacturing plant and a large insurance company	UHS	Well-being Distress (depression, anxiety) Illness (somatic)	*Well-being:* Measure assessed participants' comfort and level of satisfaction with self, relations with others, ability to meet life demands, and ability to enjoy things *Depression, anxiety, somatic complaints:* Assessed through a 3-dimenional, 26-item scale designed to measure strain
Marsh, V. (1997)	36	unk	Nurses	PVS	Burnout	Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 27 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Martin, J. J., Kelley, B., Eklund, R. C. (1999)	294	0	Male high school athletic directors	CHS	Burnout	Maslach Burnout Inventory
Martin-Neuckermans, A. (1994)	128	100	Female community sample from the San Francisco area	PVS	Physical health	Single item measure assessing perceived health status ranging from excellent to poor
Mastalerz, L. H. (2000)	158	86	Catholic elementary school principals	PVS	Burnout	Maslach Burnout Inventory (MBI)
Mathis, M., Lecci, L. (1999)	63	81	College students	PVS	Physical health	Study specific assessment of participants overall perceptions of physical health
McCalister, K. T., Dolbier, C. L., Webster, J. A., Mallon, M. W., Steinhardt, M. A. (2006)	310	21	Employees at a high tech company	DRS	Job satisfaction	Single item measure from the Job Satisfaction Survey assessing overall job satisfaction

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 28 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
McCalister, K. T., Dolbier, C. L., Webster, J. A., Mallon, M. W., Steinhardt, M. A. (2006)	745	65	Employees at a state governmental agency	DRS	Job satisfaction	Single item measure from the Job Satisfaction Survey assessing overall job satisfaction
McCranie, E. W., Lambert, V. A., Lambert, C. E., Jr. (1987)	107	95	Nurses	RHS	Burnout	Tedium Burnout Scale
McNeil, K., Kozma, A., Stones, M. J., Hannah, E. A (1986)	223	70	Community sample consisting of individuals over 50 years of age (Mean = 63)	AHS	Well-being (cognitive)	Memorial University of Newfoundland Scale of Happiness
Mirzadeh, S. Ali (1999)	102	52	International students	PVS II	Distress (depression, anxiety) Illness (somatic)	Depression, Anxiety, and Somatic Complaints scales from the SCL-90
Morelock, D. F. (1994)	501	78	Teachers	PVS	Burnout	Maslach Burnout Inventory-Ed (MBI-Ed)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 29 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Nelson, N. D. (1988)	82	71	Older adults (combination of community dwelling and individuals residing in assisted living or retirement residential complexes)	PVS	Well-being (cognitive)) Physical health	*Well-being:* Life Satisfaction Index - A (LSIA) *Health:* Self-rating scale assessing general perceptions of overall health
Neria, Y., Guttmann-Steinmetz, S., Koenen, K., Levinovsky, L., Zakin, G., Dekel, R. (2001)	434	0	17-year male candidates for service in an elite unit in the Israeli Defense Forces exposed to a 2-day military simulation exercise	PVS	Well-being (combination) Distress (general)	Mental Health Inventory: Multidimensional questionnaire assessing two bipolar factors: perceptions of general well-being and psychological distress
Nowack, K. M. (1986)	189	68	University employees (81% in supervisory positions)	Study specific	Distress (general) Burnout	*Distress:* Hopkins Symptom Checklist *Burnout:* Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 30 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Nowack, K. M. (1989)	194	42	Managers and professionals	CHS	Distress (general) Illness (medical)	*Distress:* Hopkins Symptom Checklist *Illness:* 8-item scale assessing frequency of experiencing specific physical symptoms or categories of symptoms
Nowack, K. M. (1990)	466	47	Professionals and managers	CHS	Well-being (cognitive)	12-item assessment measuring overall life satisfaction and absence of psychological distress
Nowack, K. M. (1991)	95	44	Supervisors, managers and professionals working in a large aerospace company	CHS	Well-being (cognitive)	12-item assessment measuring overall life satisfaction and absence of psychological distress
Nowack, K. M., Hanson, A. L. (1983)	37	unk	Undergraduate resident assistants	CHS	Burnout Illness (medical)	*Burnout:* Maslach Burnout Inventory (MBI) *Illness:* Seriousness of Illness Rating Scale (SIRS)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 31 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Nunley, B. L. (2002)	44	55	Caregivers for spouses with dementia	PVS III	Well-being (cognitive) Distress (depression)	*Well-being:* Cantril's Quality of Life Ladder *Depression:* Center for Epidemiological Studies Depression Scale (CES-D)
Okun, M. A., Zautra, A. J., Robinson, S. E. (1988)	33	100	Female rheumatoid arthritis patients	PVS	Physical health	Single item measure assessing perceptions of overall health for a person of that age (rated from excellent to bad)
Oman, R. F., Oman, K. K. (2003)	94	100	White, middle aged women participating in an exercise program	DRS	Distress (depression)	Center for Epidemiological Studies Depression Scale (CES-D)
Paulik, K. (2001)	158	47	Full-time lecturers at Czech universities	PVS	Illness/injury (medical)	Duration of absences from work during the previous year (self-report)
Pengilly, J. W., Dowd, E. T. (2000)	105	60	College students	PVS	Distress (depression)	Beck Depression Inventory (BDI)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 32 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Patusky, K. L. (1999)	34	85	Older adults living in or around a university community in the Midwest	DRS-15	Well-being (combination) Distress (anxiety)	*Well-being:* Composite measure of well-being consisting of 8 items from the Affect Balance Scale and 7 items from the Life Satisfaction Scale - Z *Anxiety:* Symptom Checklist 90 (SCL-90) Anxiety subscale
Perez, A. M. (1998)	130	62	Dominican immigrants living in NY	PVS II	Distress (depression) Illness (somatic)	*Depression:* Center for Epidemiological Studies Depression Scale (CES-D) *Illness:* Selected items from the Diagnostic Interview Schedule - Somatization Subscale
Pierce, C. M., Molloy, G. N. (1990)	750	unk	Teachers	RHS	Burnout	*Maslach Burnout Inventory*
Pierce, C. M., Molloy, G. N. (1990)	750	unk	Teachers	RHS	Burnout	Maslach Burnout Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 33 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Pollachek, J. B. (2001)	102	85	Chronic Fatigue Syndrome patients	PVS	Physical health	Physical Health subscale of the 36-item short form of the Medical Outcomes Study Inventory (SF-36)
Rahim, M. A. (1990)	55	unk	Stratified random sample of employees from a manufacturing plant	Study specific	Burnout	Maslach Burnout Inventory
Rhodes, R. S. (1994)	121	61	Healthy adults between 65 and 90 years of age	PVS	Well-being (cognitive)	Life Satisfaction Index - A (LSIA)
Rhodewalt, F., Zone, J. B. (1989)	212	100	Women who attended Westminster College in the years 1972-1979	AHS	Distress (depression) Illness (medical)	*Depression:* Beck Depression Inventory *Illness:* Seriousness of Illness Rating Scale
Rice, M. (1997)	62	100	Female University of Calgary students who had sought counseling services	Dane's Hardi Survey	Distress (depression)	Beck Depression Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 34 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Rice, M. (1997)	62	100	Female University of Calgary students who had sought counseling services	Dane's Hardi Survey	Distress (depression)	Beck Depression Inventory
Rich, V. L., Rich, A. R. (1987)	100	100	Nurses	UHS	Burnout Illness/injury (medical)	*Burnout:* Staff Burnout Scale for Health Professionals *Illness/injury:* Number of days ill during the preceding 12-month period
Robitschek, C., Kashubeck, S. (1999)	163	100	Female college students	DRS	Well-being (cognitive) Distress (depression, general)	*Well-being:* Satisfaction with Life Scale *Depression:* Center for Epidemiological Studies Depression Scale
Robitschek, C., Kashubeck, S. (1999)	131	0	Male college students	DRS	Well-being (cognitive) Distress (depression, general)	*Well-being:* Satisfaction with Life Scale *Depression:* Center for Epidemiological Studies Depression Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 35 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Rosen, L. N., Wright, K., Marlow, D., Bartone, P., Gifford, R. K. (1999)	856	0	Male U.S. Army soldiers	DRS	Distress (general)	*Global Severity Index (GSI) from the Brief Symptom Inventory (BSI)*
Rosen, L. N., Wright, K., Marlow, D., Bartone, P., Gifford, R. K. (1999)	169	100	Female U.S. Army soldiers	DRS	Distress (general)	Global Severity Index (GSI) from the Brief Symptom Inventory
Roth, D. L., Wiebe, D. J., Fillingim, R. B., Shay, K. A. (1989)	373	58	College students	UHS	Illness (medical)	Seriousness of Illness Rating Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 36 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Rowe, M. M. (1997)	448	71	Healthcare professionals (nurses, hospital & clinical staff, lab & testing specialists, physicians, health administrators, psychologists/ social workers/counselors)	CHS	Burnout	Maslach Burnout Inventory
Rowe, M. M. (1998)	264	75	Healthcare professionals	CHS	Burnout	Maslach Burnout Inventory
Rush, M. C., Schoel, W. A., Barnard, S. M. (1995)	325	43	Government employees: senior-level employees (managers)	Study specific	Job satisfaction	General satisfaction items from the Job Diagnostic Survey (JDS)
Schafer, W. E., McKenna, J. F. (1991)	219	4	City managers	Study specific	Distress (general)	Distress Symptom Scale
Schmied, L. A., Lawler, K. A. (1986)	82	100	Female secretaries	UHS	Illness (medical)	Seriousness of Illness Rating Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 37 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Schoenig, T. M. (1987)	188	67	Public school teachers (K-12)	RHS	Burnout	Maslach Burnout Inventory
Sciacchiatano, M., Goldstein, M. B., DiPlacido, J. (2001)	95	81	Radiographers	PVS	Burnout	Staff Burnout Scale for Health Professionals
Sears, S. F., Jr., McKillop, K. J., Jr. (1990)	305	unk	College students currently employed in the athletic training profession	PVS	Distress (depression)	Beck Depression Inventory
Sears, S. F., Jr., McKillop, K. J., Jr. (1990)	305	unk	College students currently employed in the athletic training profession	PVS	Distress (depression)	Beck Depression Inventory
Sewell, M. C. (1997)	26	100	Women with AIDS	Modified PVS	Well-being (cognitive) Distress (depression)	*Well-being:* Quality of Life Enjoyment and Satisfaction Questionnaire *Depression:* Hamilton Depression Rating Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 38 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Shapiro, S. H. (1987)	350	50	College students	PVS	Job satisfaction	Job satisfaction measured as a composite of overall satisfaction combined with satisfaction scores across 18 specific facets of the job
Sharpley, C. F., Yardley, P. (1999)	129	46	Australian older adults living in the Melbourne area	CHS	Distress (depression)	Depression-Happiness Scale
Simoni, P. S., Paterson, J. J. (1997)	440	unk	Nurses	RHS	Burnout	Tedium Burnout Scale
Sims, K. M. E. (2000)	74	95	Nurses	PVS II	Burnout	Maslach Burnout Inventory
Sinclair, R. R., Oliver, C. M. (2003)	1,465	5	Members of an activated National Guard unit	DRS-II	Well-being (combination) Distress (general)	Well-being: Well-being related factor from the GHQ-12 Distress: Distress related factor from the GHQ-12

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 39 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Sinclair, R. R., Oliver, C. M., Ippolito, J., Ascalon, E. (2006)	482	69	College students	DRS-II	Well-being (cognitive) Physical health	*Life satisfaction:* Satisfaction with Life Scale *Health:* 21-item scale assessing health concerns, overall health perceptions relative to similar others, past health-related experiences and future expectations
Sinclair, R. R., Tetrick, L. E. (2000)	426	61	College students	Modified DRS	Distress (depression, anxiety)	*Depression:* 6-item measure assessing frequency of psychosomatic events (e.g., feeling depressed, restless, or cheerful) *Anxiety:* 10-item scale assessing physical symptoms such as upset stomach, dizziness, nervousness)
Skau, M. (2002)	241	71	Predoctoral interns in clinical and counseling psychology	PVS	Job satisfaction	Job-in-General scale (JIG)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 40 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Skirka, N. (2000)	136	0	Male college students (combination of athletes and non-athletes)	PVS	Distress (general)	Profile of Mood States
Skirka, N. (2000)	134	100	Female college students	PVS	Distress (general)	Profile of Mood States
Sladeczek, I. E. (1993)	165	62	College students	PVS	Distress (depression)	Beck Depression Inventory
Smith, J. V. (1995)	164	66	College students	CHS	Distress (general) Illness (medical)	*Distress:* Symptoms Checklist-90 (SCL-90) *Illness:* Seriousness of Illness Rating Scale
Smith, T. J. (1991)	129	79	Non-institutionalized rural older adults	AHS	Well-being (cognitive) Physical health	*Well-being:* Life Satisfaction Index - Z *Health:* Modified version of Cantril's Health Status Ladder
Smith, T. L., Meyers, L. S. (1997)	336	63	College students	PVS	Illness (somatic)	*Illness:* Perceptions of resistance to colds and flus

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 41 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Smochek, M. R. (1992)	217	100	Senior, undergraduate nursing students	PVS	Burnout Physical health	*Burnout:* Maslach Burnout Inventory (MBI) *Health:* Health Perceptions Questionnaire
Soderstrom, M., Dolbier, C., Leiferman, J., Steinhardt, M. (2000)	110	64	3M employees	DRS	Illness (somatic)	Somatic complaints subscale of the SCL-90
Soderstrom, M., Dolbier, C., Leiferman, J., Steinhardt, M. (2000)	270	62	College students	DRS	Illness (somatic)	Somatic complaints subscale of the SCL-90
Spampneto, A. M. (1996)	261	62	Working adults	PVS II	Well-being Distress	Mental Health Inventory: Multidimensional questionnaire assessing two bipolar factors: perceptions of general well-being and psychological distress

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 42 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Spradling, G. M. (2000)	61	0	Married men over the age of 60	PVS II	Well-being (cognitive)	Salamon-Conte Life Satisfaction Scale
Spradling, G. M. (2001)	62	100	Married women over the age of 60	PVS II	Well-being (cognitive)	Salamon-Conte Life Satisfaction Scale
Steinhardt, M. A., Dolbier, C. L., Gottlieb, N. H., McCalister, K. T. (2003)	160	47	Dell employees	DRS	Job satisfaction	4-item, proprietary instrument assessing the extent to which employees experience their work as fulfilling important job values
Stokes-Crowe, L. A. (1998)	492	63	Combined sample of college students (includes participants from studies 654.1 and 654.2)	DRS	Well-being (combination) Distress (general) Physical health	*Well-being and distress:* Assessed through the Mental Health Inventory - a multidimensional questionnaire assessing two bipolar factors: perceptions of general well-being and psychological distress *Health:* 20-item Short Form version of the Medical Outcomes Study General Health Survey (SFHS-20)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 43 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Sullivan, Grace C. (1987)	154	100	Senior nursing students	PVS	Distress (general) Illness (medical)	*Distress:* Langner 22-item Symptom Score *Illness:* Seriousness of Illness Rating Scale
Sussman, G. M. (2002)	42	67	Caregivers of dementia patients	PVS III	Distress (depression, anxiety)	*Depression:* Beck Depression Inventory *Anxiety:* Beck Anxiety Inventory
Taft, C. T., Stern, A. S., King, L. A., King, D. W. (1999)	1,156	0	Male Vietnam veterans	Study specific	Illness/injury (medical)	Assessment of a broad array of health problems including conditions such as high blood pressure, gastrointestinal issues (e.g., ulcers), respiratory problems (e.g., asthma), and musculoskeletal issues (e.g., permanent stiffness or deformity of the foot, leg, or back)

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 44 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Taft, C. T., Stern, A. S., King, L. A., King, D. W. (1999)	423	100	Female Vietnam veterans	Study specific	Illness (medical)	Assessment of a broad array of health problems including conditions such as high blood pressure, ulcers, respiratory problems (e.g., asthma), and musculoskeletal issues (e.g., permanent stiffness or deformity of the foot, leg, or back)
Tang, T. L. P., Hammontree, M. L. (1992)	100	2	Police officers	UHS	Illness (medical)	Seriousness of Illness Rating Scale
Topf, M. (1989)	100	91	Nurses	Study specific	Burnout	Burnout components assessed through the Maslach Burnout Inventory (MBI); burnout composite assessed through the Staff Burnout Scale for Health Professionals (SBS-HP)
van Servellen, G., Topf, M., Leake, B. (1994)	237	86	Nurses	PVS	Distress (anxiety) Illness (somatic)	Anxiety, and Somatic Complaints scales from the Brief Symptom Inventory

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 45 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
van Servellen, G., Topf, M., Leake, B. (1994)	237	86	Nurses	PVS	Distress (anxiety) Illness (somatic)	Anxiety, and Somatic Complaints scales from the Brief Symptom Inventory
Venkatachalm, M. (1995)	300	46	Employees from all levels of a large computer peripherals manufacturing company	PVS	Distress Job satisfaction	*Distress:* General Health Questionnaire *Job satisfaction:* Hoppock Satisfaction Scale
Voyce, J. A. (1996)	84	24	Patients in a chemical dependency treatment program through a regional psychiatric facility	PVS	Distress (depression)	Depression Adjective Checklist - Form E

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 46 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Wallace, K. A. (2003)	295	0	Older men living in Montana (aged 61-89)	DRS	Well-being (cognitive) Distress, (depression) Physical health	*Well-being:* Life Satisfaction Index, Form Z (LSIZ) *Depression:* Center for Epidemiological Studies Depression Scale (CES-D) *Health:* 6-item scale tapping respondent's perceptions of their global health status (e.g., current health, health compared with 5-years ago, health status relative to others of the same age, energy level compared with others of the same age)
Weissman, T. D. (2003)	259	0	College students and competitors from a collectible card trading event	PVS III-R	Distress (general)	Behavior and Symptom Identification Scale (32-item measure assessing general psychological health across 5 dimensions)
Wells, D. L. (1987)	424	2	Farmers	PVS	Distress (general) Illness (medical)	*Distress:* Brief Symptom Inventory (BSI) *Illness:* Medical Conditions subscale from the Health and Daily Living (HDL) Adult Form

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 47 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Wiebe, D. J. (1988)	820	59	College students	UHS	Illness (medical)	Seriousness of Illness Rating Scale
Wiebe, D. J., McCallum, D. M. (1986)	86	70	College students	UHS	Illness (medical)	Seriousness of Illness Rating Scale
Wilder, B. (1995)	96	78	Community dwelling older adults	PVS	Well-being (cognitive) Physical health	*Well-being:* Life Satisfaction Index, Form Z (LSIZ) *Health:* Medical Outcome Study Health Survey, Short Form 36 (SF-36)
Williams, D., Lawler, K. A. (2001)	100	100	Low income women	DRS	Illness (medical)	Seriousness of Illness Rating Scale
Williams, S. J. (1990)	162	100	Nurses	PVS	Illness (medical)	Seriousness of Illness Rating Scale
Wright, T. F., Blache, C. F., Ralph, J., Luterman, A. (1993)	31	84	Nurses	Hardiness Test (no citation, no description)	Burnout	Tedium Burnout Scale

Table A1 (continued)
Descriptive Information for Meta-Analysis Studies (part 48 of 48)

Author (Year)	*N*	*% Female*	*Sample Description*	*Hardiness Measure*	*Correlates*	*Assessments*
Yoshimura, E. C. (1991)	210	71	Working adults seeking services from Employee Assistance Programs	PVS	Distress (general) Illness (medical)	*Distress:* Brief Symptom Inventory *Illness:* Seriousness of Illness Rating Scale

Notes. **UHS** = the 2nd generation Hardiness Test consisting of the following: Alienation from self work subscales from the Alienation Test (Maddi, Kobasa, & Hoover, 1979), the Powerlessness Scale (Maddi, Kobasa, & Hoover, 1979) and the External Locus of Control Scale (Rotter, Seeman, & Liverant, 1962), the Security Scale (Hahan, 1966) and the Cognitive Structure Scale (Jakcson, 1974), although some studies employing the UHS did not include the Security Scale. **RHS** = the 2nd generation Revised Hardiness Scale (Kobasa, Maddi, & Courington, 1981). **AHS** = the 2nd generation, 20-item Abridged Hardiness Scale (Kobasa & Maddi, 1982). **PVS** = the 3rd generation Personal Views Survey (Hardiness Institute, 1985); **PVS II** = Personal Views Survey II, **PVS III** = the 4th generation Personal Views Survey III, **PVS III-R** = the Revised Personal Views Survey III. **DRS** = the 3rd generation Dispositional Resilience Scale (Bartone, Ursano, Wright, & Ingraham, 1989). **DRS-II** = the 4th generation Dispositional Resilience Scale II (Sinclair & Oliver, 2003).

APPENDIX C: OUTLIER ANALYSES

Table A2
Summary Information: Potential Outlier Effect Sizes

	Overall N	*Overall K*	*Outlier Information*			M_r (SD_r) values	
			No. of studies	Outlier values	Study *N*	"Outliers" included	"Outliers" excluded
Subjective Well-Being							
Commitment	3,233	13	1	.14	434	.43 (.17)	.45 (.13)
Psychological Distress							
Commitment	12,119	50	1	-.02	18	-.41 (.13)	-.41 (.13)
Burnout							
Composite	9,289	44	1	-.13	55	-.46 (.13)	-.46 (.13)
Illness/injury							
Composite	12,336	54	2			-.24 (.16)	-.22 (.15)
Study 1				-.70	60		
Study 2				-.65	110		
Commitment	3,863	20	1	-.57	210	-.26 (.15)	-.24 (.12)
Challenge	3,863	20	2			-.12 (.15)	-.08 (.07)
Study 1				-.50	110		
Study 2				-.38	210		

Figure A1. Scatterplot diagram for Hardiness-Burnout effect sizes

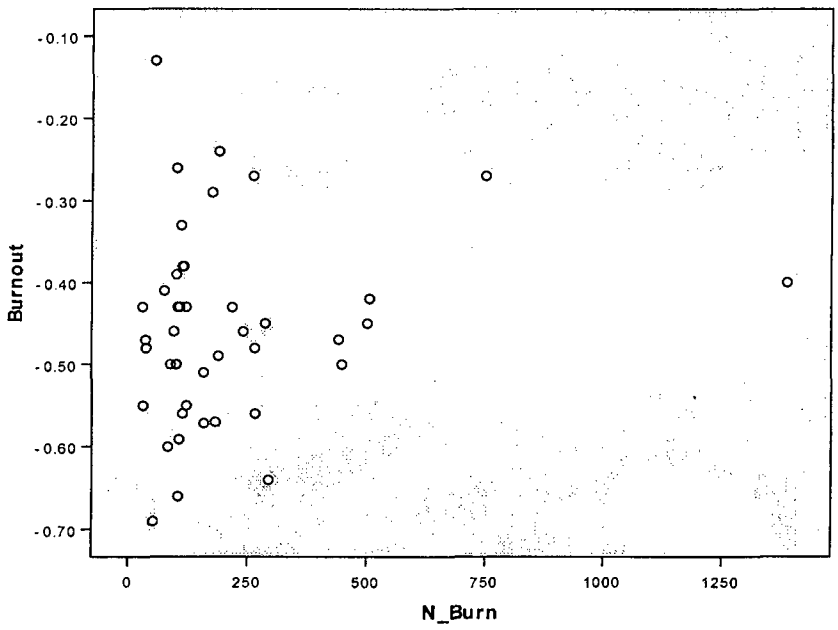

Figure A2. Boxplot diagram for Hardiness-Burnout effect sizes

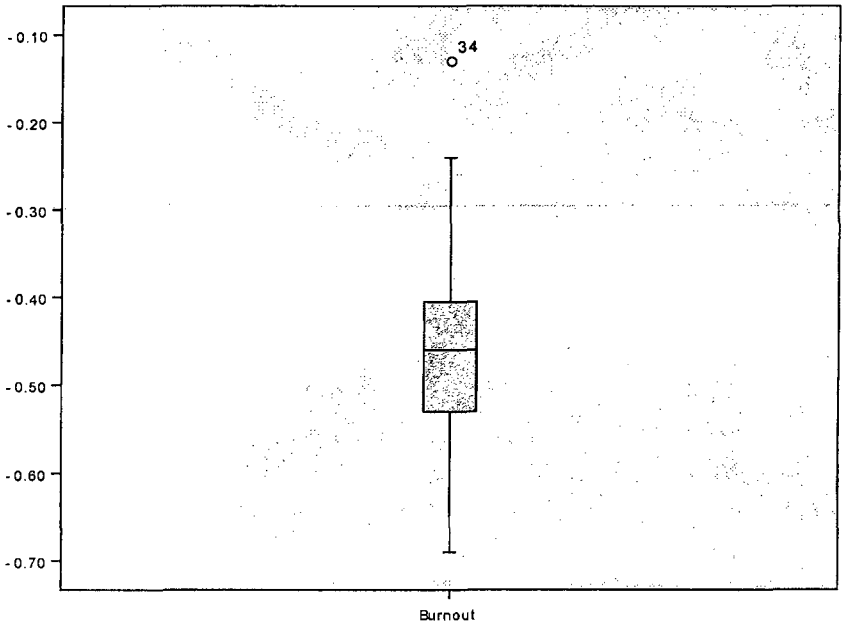

Figure A3. Stem-and-leaf plot for Hardiness-Burnout effect sizes

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Frequency    Stem &  Leaf

   2.00      -6 .  69
   1.00      -6 .  4
   7.00      -5 .  5566779
   5.00      -5 .  00001
  10.00      -4 .  5556677889
   9.00      -4 .  001233333
   3.00      -3 .  889
   1.00      -3 .  3
   4.00      -2 .  6779
   1.00      -2 .  4
   1.00 Extremes    (>=-.13)

Stem width:     .10
Each leaf:      1 case(s)
```

Figure A4. Scatterplot diagram for Hardiness-Illness/injury effect sizes

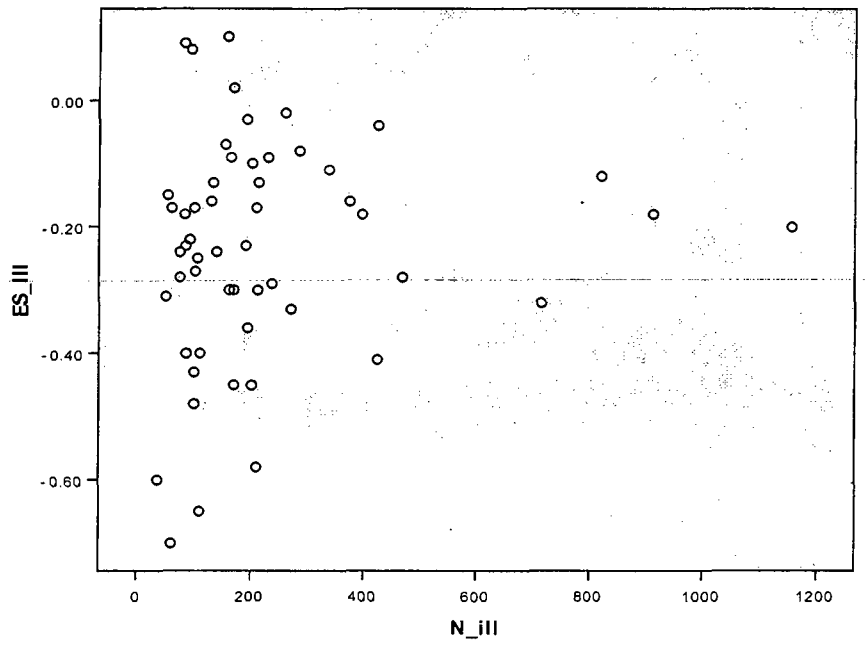

Figure A5. Boxplot diagram for Hardiness-Illness/injury effect sizes

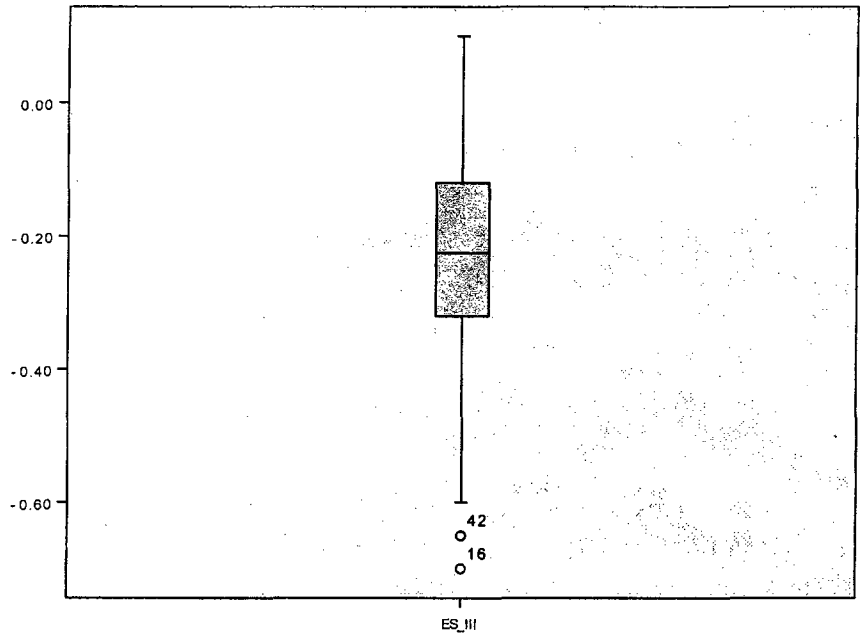

Figure A6. Stem-and-leaf plot for Hardiness-Illness/injury effect sizes

```
Frequency    Stem &  Leaf

   2.00 Extremes    (=<-.65)
    .00      -6 .
   1.00      -5 .  8
   8.00      -4 .  00013558
   4.00      -3 .  1236
  11.00      -2 .  02334457889
  17.00      -1 .  00001233566777888
   7.00      -0 .  2347899
   3.00       0 .  289
   1.00       1 .  0

Stem width:      .10
Each leaf:       1 case(s)
```

Figure A7. Scatterplot diagram for Commitment-SWB effect sizes

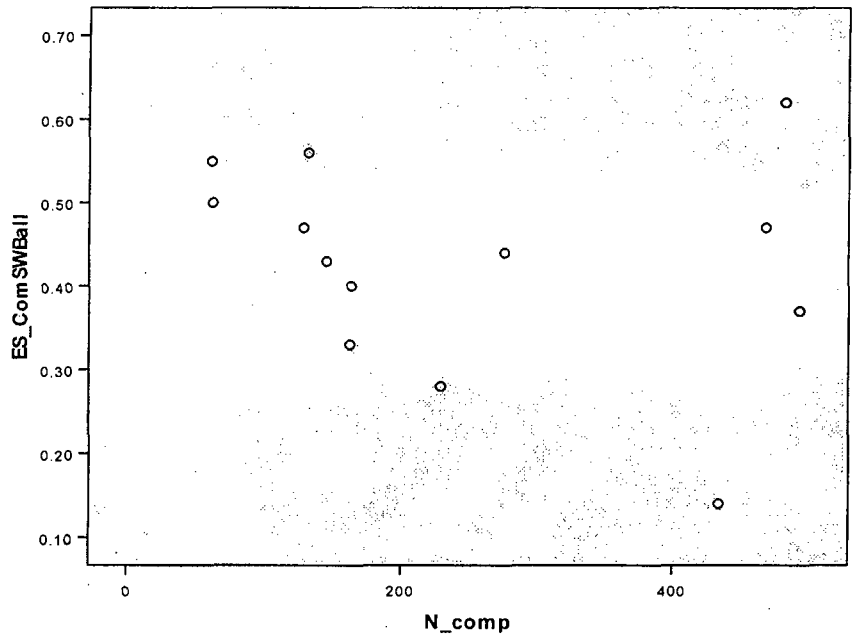

Figure A8. Boxplot diagram for Commitment-SWB effect sizes

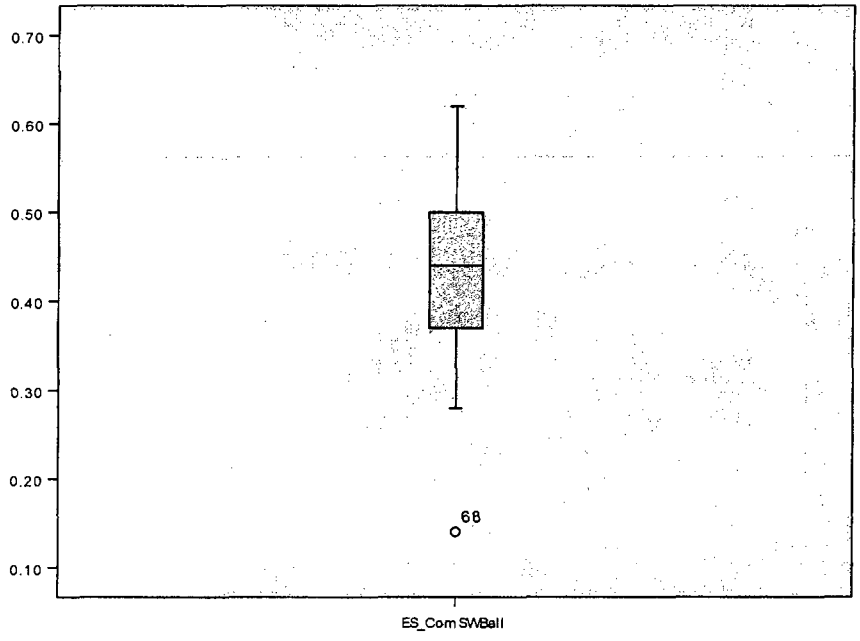

Figure A9. Stem-and-leaf plot for Commitment-SWB effect sizes

```
Frequency    Stem &  Leaf

   1.00 Extremes    (=<.14)
   1.00       2 .  8
   1.00       3 .  3
   1.00       3 .  7
   3.00       4 .  034
   2.00       4 .  77
   1.00       5 .  0
   2.00       5 .  56
   1.00       6 .  2

Stem width:      .10
Each leaf:       1 case(s)
```

Figure A10. Scatterplot diagram for Commitment-Distress effect sizes

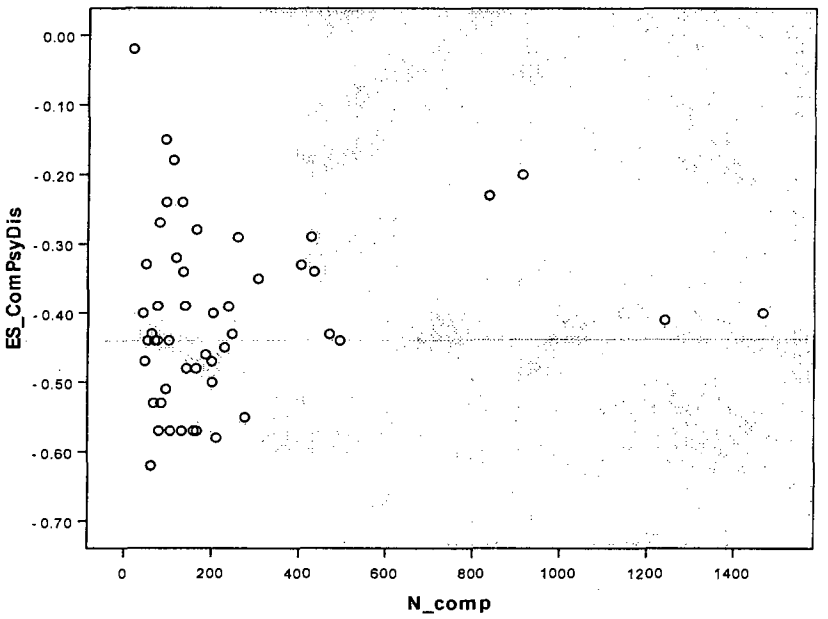

Figure A11. Boxplot diagram for Commitment-Distress effect sizes

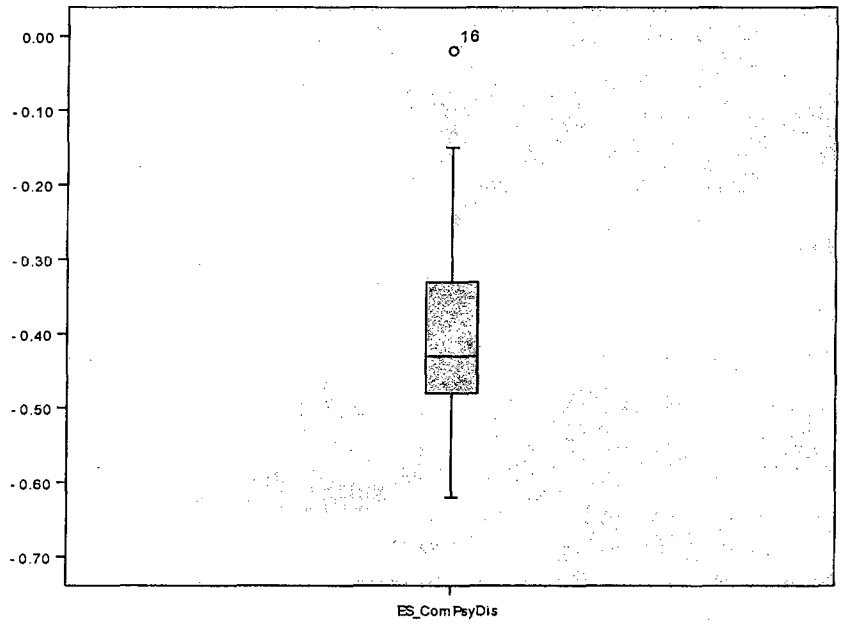

Figure A12. Stem-and-leaf plot for Commitment-Distress effect sizes

```
Frequency    Stem &  Leaf

   1.00      -6 .  2
   7.00      -5 .  5777778
   4.00      -5 .  0133
   6.00      -4 .  567788
  12.00       -4 .  000133344444
   4.00      -3 .  5999
   5.00      -3 .  23344
   4.00      -2 .  7899
   4.00      -2 .  0344
   2.00      -1 .  58
    .00      -1 .
   1.00 Extremes    (>=-.02)

Stem width:      .10
Each leaf:       1 case(s)
```

Figure A13. Scatterplot diagram for Commitment-Illness/injury effect sizes

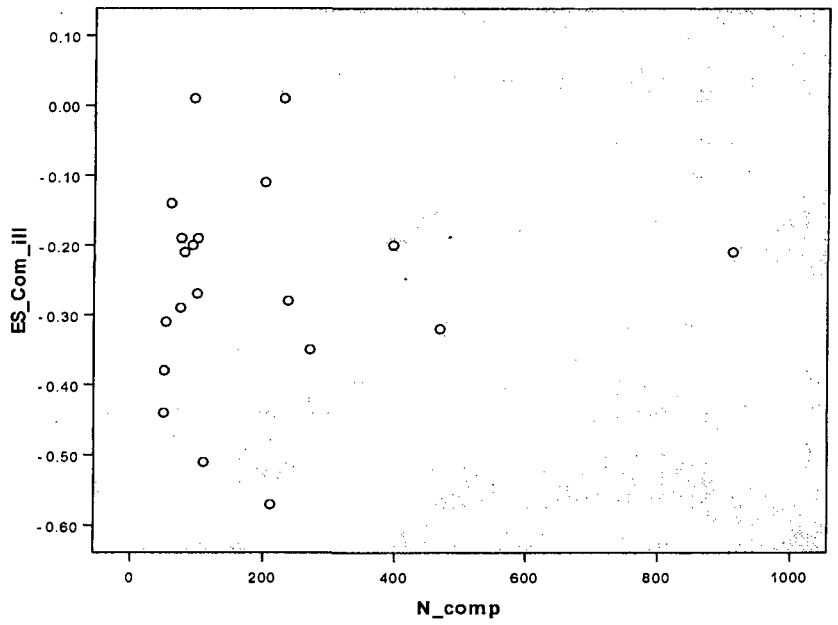

Figure A14. Boxplot diagram for Commitment-Illness/injury effect sizes

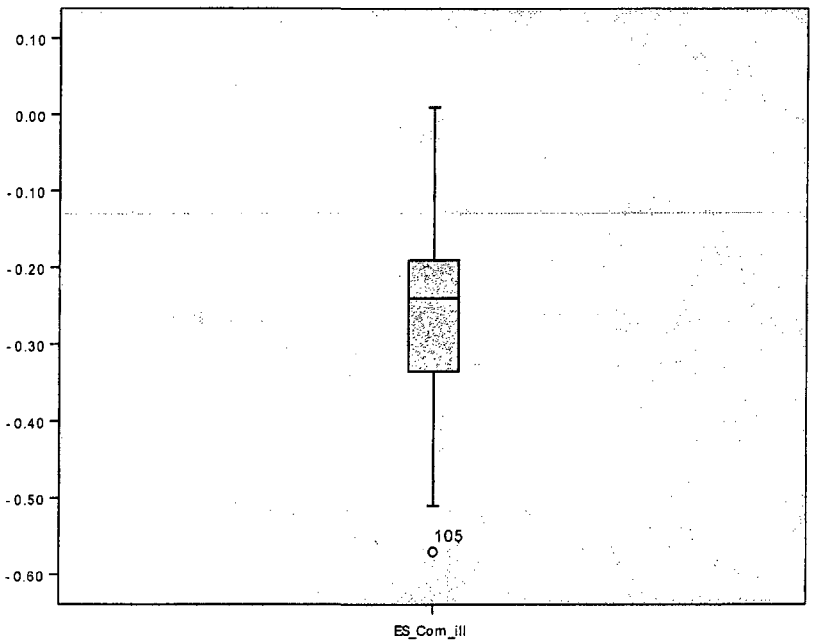

Figure A15. Stem-and-leaf plot for Commitment-Illness/injury effect sizes

```
Frequency    Stem &  Leaf

   1.00 Extremes    (=<-.57)
   1.00      -5 .  1
    .00      -4 .
   1.00      -4 .  4
   2.00      -3 .  58
   2.00      -3 .  12
   3.00      -2 .  789
   4.00      -2 .  0011
   2.00      -1 .  99
   2.00      -1 .  14
    .00      -0 .
    .00      -0 .
   2.00       0 .  11

Stem width:      .10
Each leaf:       1 case(s)
```

Figure A16. Scatterplot diagram for Challenge-Illness/injury effect sizes

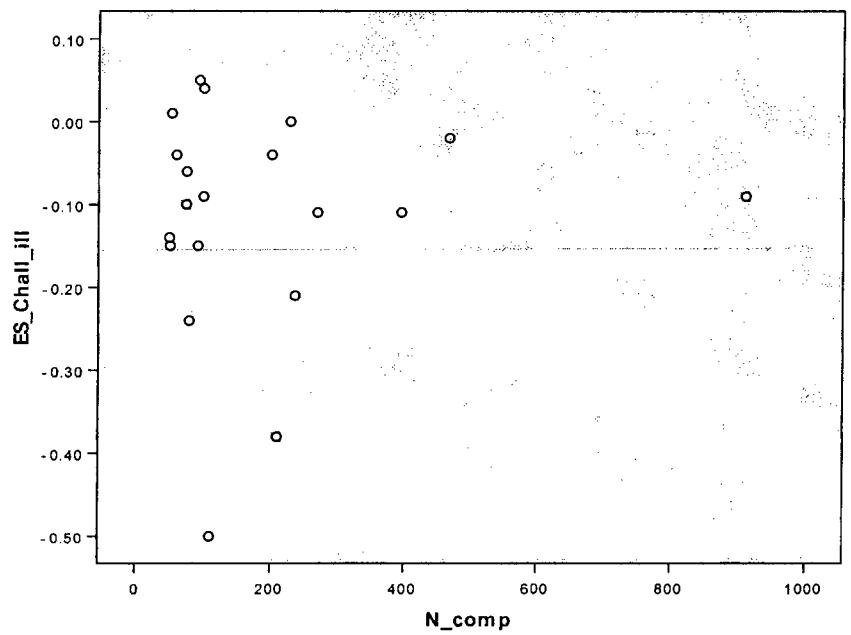

Figure A17. Boxplot diagram for Challenge-Illness/injury effect sizes

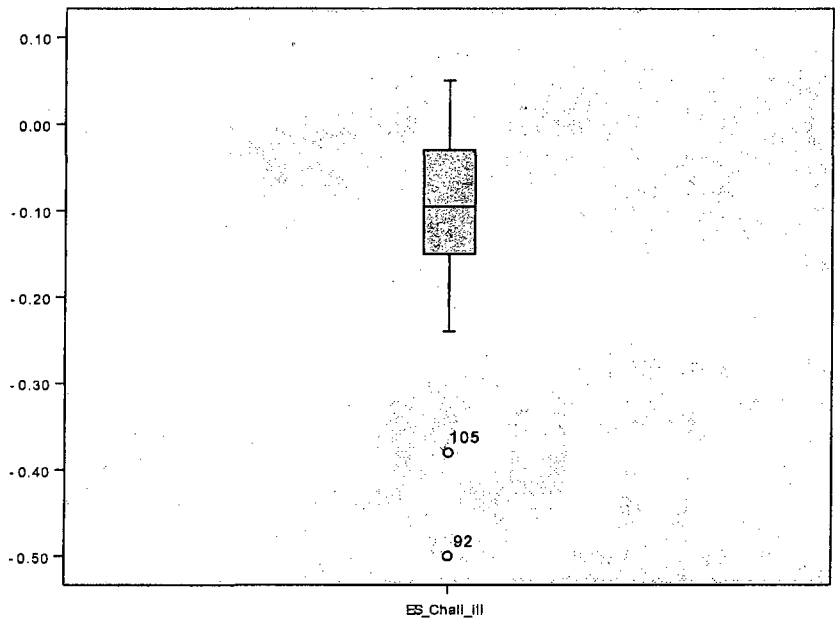

Figure A18. Stem-and-leaf plot for Challenge-Illness/injury effect sizes

```
Frequency    Stem &  Leaf

   2.00 Extremes    (=<-.38)
   1.00      -2 .  4
    .00      -2 .
   1.00      -2 .  1
    .00      -1 .
    .00      -1 .
   3.00      -1 .  455
    .00      -1 .
   3.00      -1 .  011
   2.00      -0 .  99
   1.00      -0 .  6
   2.00      -0 .  44
   1.00      -0 .  2
    .00      -0 .
   2.00       0 .  01
    .00       0 .
   2.00       0 .  45

Stem width:      .10
Each leaf:       1 case(s)
```