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# Deployment Risk and Resilience Inventory: A Collection of Measures for Studying Deployment-Related Experiences of Military Personnel and Veterans

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This article describes the development of an inventory to assess key psychosocial risk and resilience factors for military personnel and veterans deployed to war zones or other hazardous environments. Part 1 details the definition and operationalization of the 14 constructs: 2 predeployment factors (e.g., childhood family environment), 10 deployment or war-zone factors (e.g., concerns about life and family disruptions, deployment social support, combat experiences), and 2 postdeployment factors (e.g., postdeployment stressors). In Parts 2 and 3, data from 2 separate national samples of Gulf War veterans were used to refine item sets and establish estimates of internal consistency reliability. Part 4 employed a 3rd new national sample of Gulf War veterans to document evidence for validity in terms of relations with mental and physical health.

The impact of deployment and especially war-zone experiences on the well-being of military personnel and veterans has received much research attention. Combat exposure has been linked to an array of negative health consequences, most notably posttraumatic stress disorder (PTSD; e.g., Foy, Resnick, Supprelle, & Carroll, 1987; Green, Grace, Lindy, Gleser, & Leonard, 1990; Kaylor, King, & King, 1987; Kulka et al., 1990), but also depression (e.g., Erickson, Wolfe, King, King, & Sharkansky, 2001; Sharkansky et al., 2000), substance abuse (e.g., Boscarino, 1981; Helzer, 1984), and aspects of physical health (e.g., Taft, Stern, King, & King, 1999; Wolfe, Schnurr, Brown, & Furey, 1994). Yet, other features of the deployment experience (e.g., subjective fear), characteristics of one's predeployment life (e.g., family distress), and aspects of the reentry and postdeployment environment (e.g., additional life stressors) also may play important roles in determining health-related outcomes (e.g., D. W. King, King, Foy, & Gudanoski, 1996; L. A. King, King, Fairbank, Keane, & Adams, 1998; Solomon & Mikulincer, 1990). The purpose of this study was to develop an inventory to assess a broad array of key psychosocial risk and resilience factors for deployed military personnel and demonstrate associations of these factors with veterans' mental and physical health. In the remainder of this section, we briefly make a case for a multidimensional approach to understanding the deployment experience as a prelude to describing our four-phase test construction process.

Exposure to combat, including being fired on and witnessing the death of fellow unit members, is the stressor that has dominated military veteran research, with implications for both acute and chronic stress reactions (e.g., Kaylor et al., 1987; Kulka et al., 1990; Solomon, Garb, Bleich, & Grupper, 1987). Although there are a number of widely used measures of combat exposure (e.g., variations on scales introduced by Gallops, Laufer, & Yager, 1981, or Keane et al., 1989), they were largely developed in the context of the Vietnam War. This may be somewhat problematic because a number of contemporary combat experiences are likely to differ from those of earlier conflicts (Marshall, Davis, & Sherbourne, 2000). Moreover, a literature review of the consequences of military deployment indicates perhaps an overemphasis on combat per se, to the exclusion of other potentially important di-

mensions. For example, a good portion of military personnel may never engage in combat activities but are nonetheless charged with duties in the aftermath of battle that are moderately to highly distressing, such as managing prisoners of war or caring for the injured and dying. They also likely witness the destruction of homes and communities and the anguish of refugees following combat. Prior research with veterans of the 1990-1991 Gulf War, moreover, has shown that the handling of human remains was especially disturbing (McCarroll, Ursano, & Fullerton, 1995; Sutker, Uddo, Brailey, Vasterling, & Errera, 1994).

Using a national sample of male and female Vietnam veterans, D. W. King, King, Gudanoski, and Vreven (1995) demonstrated the differential contributions of several other representations of war-zone stressors to PTSD symptomatology, including more subjective reports of fear and lower magnitude everyday discomforts. Indeed, in their sequence of studies (see D. W. King, King, Foy, Keane, & Fairbank, 1999), perceived threat of bodily harm or death served as a major mediator for variable accounting for the association between the more objective combat experiences and PTSD symptom severity. In addition, anticipatory fear or perceived threat with regard to nuclear, biological, or chemical weaponry and SCUD missiles repeatedly has been cited as an overwhelming concern of many men and women deployed to the first Gulf War (e.g., Malone et al., 1996), and there is still an active scientific agenda directed toward identifying putative toxic agents that may have affected the physical health of veterans of that conflict, most notably in the form of "Gulf War illnesses" (Institute of Medicine, 1996; Persian Gulf Veterans Coordinating Board, 1996, 1997; Presidential Advisory Committee on Gulf War Veterans' Illnesses, 1996, 1997; Research Working Group of Military and Veterans Health Coordinating Board, 2000, 2001, 2002). Further, deployments are typically accompanied by the distress and hardships related to daily life far from home, perhaps in a strange culture or extreme climate, with long work days and difficult living conditions. This form of lower magnitude stressor, termed "malevolent environment" by D. W. King et al. (1995, p. 185), has been associated with depleted intrapersonal resources and a greater vulnerability to stress reactions among Vietnam veterans (L. A. King et al., 1998) and proved useful in understanding mental health outcomes among personnel deployed to the Somalia peacekeeping mission (Litz, King, King, Orsillo, & Friedman, 1997).

Other dimensions of deployment or war-zone exposure that have precedence in the literature from the Gulf War are concerns about life and family disruptions and sexual harassment. Johnson, Cline, Marcum, and Intriss (1992) studied 22 victims of combat fatigue in the war zone. In addition to identifying features of perceived threat and the difficult living and working environment, they emphasized the salience of worries about home and family. Malone et al. (1996) and Ryan-Wenger (1992) also underscored the importance of resentment of life and family disruptions; for female personnel leaving children at home, such concerns were amplified. Sexual harassment was examined by Wolfe et al. (1998), who found that Gulf

War female veterans who were sexually harassed through unwanted touching or verbal contact of a sexual nature had increases in PTSD symptomatology that were roughly comparable to the effect of a standard deviation unit increase in combat exposure scores.

In addition to events and circumstances encountered in the war zone, an increasing body of research emphasizes predeployment risk and resilience factors that might have implications for the long-term well-being of military personnel and veterans (e.g., Brewin, Andrews, & Valentine, 2000; D. W. King et al., 1996; Rosenheck & Fontana, 1994). Among the most prominent risk factors is the individual's prior history of highly stressful life events. In this regard, both Bremner, Southwick, Johnson, Yehuda, and Charney (1993) and Zaidi and Foy (1994) found that PTSD-positive Vietnam veterans reported higher rates of childhood physical abuse than PTSD-negative Vietnam veterans. In addition, D. W. King et al. (1996) reported that premilitary exposure to natural disasters, accidents, assaults, and similar events appeared to exacerbate the effect of combat exposure on Vietnam veterans' postwar PTSD symptomatology, and Engel et al. (1993) found an association of prewar abuse history with postwar PTSD for a sample of Gulf War veterans. Relatedly, Foy et al. (1987) and McCranie, Hyer, Boudewyns, and Woods (1992) documented relations between variables characterizing family functioning and postwar stress-related symptomatology among Vietnam veterans. In terms of resilience, a cohesive family with close relationships and a nonchaotic home environment are likely to be protective against later life stressors (Garmezy, 1974; D. W. King, Vogt, & King, 2003; Rutter, 1979).

Finally, psychosocial factors in the postwar time frame have been related to veteran well-being. In the arena of general stress, a plethora of research has demonstrated that social support influences mental and physical health (S. Cohen & Wills, 1985; Holahan & Moos, 1981). Likewise, research on veteran adjustment has emphasized the quality and quantity of available postwar social support in alleviating psychological distress (e.g., Egendorf, Kadushin, Laufer, Rothbart, & Sloan, 1981, and Fontana & Rosenheck, 1994, for Vietnam veterans; Solomon, Mikulincer, & Habershaim, 1990, and Solomon, Mikulincer, & Hobfoll, 1987, for Israeli veterans of the Lebanon War). D. W. King et al. (1999) found that postwar social support was especially important for female Vietnam veterans. Of course, the negative impact of ongoing contemporaneous stressors in the course of postwar readjustment cannot be overlooked (e.g., Green et al., 1990; D. W. King et al., 1999). Because social support from family, friends, and community and additional stressful life events during the reentry-postwar period were noted as important factors for veterans returning from the Gulf War (e.g., Malone et al., 1996; Ryan-Wenger, 1992), these variables were designated for inclusion in the risk and resilience inventory developed in this study.

The primary aims of this study were to construct an inventory of psychosocial risk and resilience factors that is ecologically valid and appropriate for use with person-

nel participating in contemporary military deployments and to document its psychometric properties. In this effort, we used a broad-based approach by incorporating separate measures of diverse facets of the deployment or war-zone experience as well as important predeployment and postdeployment variables. As described in the sections that follow, the collection of measures offered here is intended to include assessment of both subjective and objective aspects of the deployment experience, to capture both high- and low-intensity stressors, and to accommodate events and circumstances encompassing both mission-related and interpersonal dimensions. Moreover, we sought to create a set of readily accessible measures that were both content and face valid for modern-day deployments and that provide some degree of standardization for researchers (psychosocial, biomedical, or otherwise) seeking tools to study aspects of contemporary military deployments.

We certainly recognize that our approach was not exhaustive and duly note that there are a number of personality variables and related individual difference characteristics that have been shown to be important in stress research. For example, there is a fairly rich literature highlighting the role of hardiness as a resilience factor in multiple veteran studies, including Israeli and U.S. soldiers (e.g., Bartone, 1999; Britt, Adler, & Bartone, 2001; Florian, Mikulincer, & Taubman, 1995; L. A. King et al., 1998; Waysman, Schwarzwald, & Solomon, 2001; Westman, 1990). Rather than efforts to create measures of personality characteristics for which there are existing well-established indexes, the emphasis here was the assessment of situational risk and resilience factors in the special context of military deployments.

In Part 1, we summarize the test development process that yielded our ultimate set of risk and resilience factors and the generation of candidate items for each measure. In Part 2, we describe a first psychometric study via telephone administration aimed at trimming the item pool, refining items as necessary, and obtaining initial estimates of item and scale characteristics, including reliability. Part 3 presents a second psychometric study that produced a paper-and-pencil form of the instrument and confirmed estimates of reliability. Part 4 documents evidence for validity in the context of health outcomes. Importantly, each part of the study relied on a different sample of veterans; Parts 2 through 4 each used a unique and separate national sample of Gulf War veterans. We close with a summary description of the product, the Deployment Risk and Resilience Inventory (DRRI), and recommendations for its use.

## PART 1: OVERVIEW OF TEST DEVELOPMENT

The development of the DRRI was based on a rational approach to test construction (Jackson, 1971; L. A. King & King, 1990; Nunnally & Bernstein, 1994) and involved several components: a review of relevant literature, ongoing refinement of definitions of key risk and resilience factors or constructs, the conduct of focus

groups with Gulf War veterans, and the generation of items for subsequent administration in survey form. These endeavors were simultaneous and iterative rather than strictly linear.

### Literature Review

Review of the literature on stress and health of military personnel and veterans was an ongoing process throughout test development. Following the recommendation of Clark and Watson (1995), the literature first was surveyed to identify key constructs largely drawn from the psychosocial domain, in this case, deployment stressors and protective factors that might be implicated in the health and well-being of military personnel and veterans. We then revisited the literature to peruse existing items from measures of related constructs. Later, the literature once more was consulted to corroborate information obtained from focus group participants.

### Definitions of Constructs

Based on a first review of the literature, we identified 11 constructs that provided a preliminary conceptual foundation of deployment risk and resilience: pre-deployment factors of prior stressors and childhood family environment; deployment factors of difficult living and working environment, concerns about life and family disruptions, sexual harassment, perceived threat, combat experiences, aftermath of battle, and perceived nuclear, biological, and chemical (NBC) exposures; and the factors of postdeployment social support and postdeployment stressors. We began with concise face-valid definitions of each construct. The definitions then were reviewed and elaborated by a group of five content experts until they agreed that each construct was represented by an appropriate working definition that included all relevant content domains. Construct definitions were revised further based on focus group information.

### Focus Groups

Focus groups were conducted to validate existing conceptualizations of key constructs and identify additional deployment risk and resilience factors that we had not previously considered. The focus group is a technique that involves a moderator-facilitated discussion among multiple participants about a specified topic of interest (Barbour & Kitzinger, 1999; Greenbaum, 1998; Krueger, 1994; Morgan, 1997). Focus groups generate qualitative data that can both enrich and extend what is known about a concept and inform item development. In turn, this knowledge can improve the content validity of instruments (Vogt, King, & King, 2004). For this study, 33 volunteers recruited from computerized registries of Gulf War veterans who had used Veterans Affairs medical facilities participated in a total of six focus groups: three groups of male veterans who were deployed from active-duty military units, one group of male veterans activated for duty from the National Guard or Reserves, one

group of female veterans, and one group of veterans that was mixed by pre-deployment duty status and gender. All were from the enlisted ranks.

Each focus group was approximately 1.5 to 2 hr in duration. In each group, the moderator drew from a set of previously developed questions to probe for themes of deployment-related risk and resilience. The moderator first asked general questions to allow participants to guide the conversation, such as "What is the first thing that comes to mind about your experience in the Gulf War?" Themes (i.e., a priori risk and resilience factors gleaned from the existing literature) were probed to help guide the discussion only when participants did not spontaneously generate them. For example, to probe concerns about life and family disruptions caused by deployment to the Gulf region, participants were asked, "What was it like to be away from your family and life back home while you were in the Gulf War?" All sessions were audiotaped with the consent of participants, and abridged transcripts of the relevant and useful portions of the discussion were generated (Krueger, 1998a, 1998b). The relevance of the discussion was determined by whether or not it contained a reference to any of our previously identified risk and resilience themes, or whether it introduced an additional factor that we had not previously considered. This information was used to refine definitions of constructs as needed, to identify additional risk and resilience factors, and to inform item writing.

The information gleaned from focus groups provided corroboration for the constructs that we had initially identified. In addition, we were able to elaborate and refine our preliminary definitions of risk and resilience factors considerably after reviewing the information generated from focus groups. The analysis of the focus group data also yielded three additional risk and resilience factors or constructs. One construct, referred to as general harassment, emerged in the focus group with female veterans. Several women reported experiencing harassment that was associated with their biological sex or social status in the military, but was not sexual in nature. Also identified as a resilience factor by a number of veterans was a sense of preparedness, the extent to which they believed they were well trained, well equipped, and mentally and physically capable of successfully confronting the challenges of the deployment. Furthermore, many participants spoke of unit camaraderie, or support from fellow unit members, superiors, and the military as a whole, as a positive feature of their deployment, and this construct was incorporated as another resilience factor. Thus, our original 11 expanded to a total of 14 risk and resilience factors to complete the conceptual framework for the DRRRI. Further details regarding the conduct of focus groups and the analysis of data can be obtained in Vogt et al. (2004).

### Item Generation

Item generation was guided by the refined list of constructs and their definitions and with ongoing reference to the literature and information from focus groups. We drew direct quotes from transcripts of the focus groups to aid in item expres-

sion. In writing items, we systematically sampled from content domains within each construct, erring on the side of overinclusiveness, with the intention of eliminating items that might prove weak or tangentially related to the construct of interest at a later point in the instrument development process (Clark & Watson, 1995). Content experts then reviewed the collection of item sets (Lynn, 1986) to confirm content relevance and breadth vis-à-vis the construct definitions by both removing redundant items and suggesting additional items. They also reworded items for simplicity and clarity and identified the appropriate response format for each item set. The review process involved several steps, and the sequence was repeated for each risk and resilience factor.

Item sets also were reviewed by military content experts, three career members of the military, two of whom served in the Gulf War. This final review resulted in a few minor wording changes but primarily served to confirm that the DRRI item content was relevant and representative of the desired constructs and that the items adequately captured the language of the target population. The initial pool included, on average, about 25 items for each risk and resilience factor. Table 1 presents definitions and sample items for each of the resulting 14 DRRI measures. As defined and scored, 10 are considered indicators of risk (prior stressors, difficult living and working environment, concerns about life and family disruptions, general harassment, sexual harassment, perceived threat, combat experiences, aftermath of battle, NBC exposures, and postdeployment stressors); 4 can be construed as measures of resilience (childhood family environment, preparedness, deployment social support, and postdeployment social support).<sup>1</sup>

## PART 2: FIRST PSYCHOMETRIC STUDY: TELEPHONE SURVEY

Part 2 was directed at selecting the best items for each measure, refining items as needed, and calculating initial estimates of item and scale characteristics. Our intent was to trim the item pool to arrive at smaller, high-quality, and more parsimonious item sets. We relied on a telephone survey method using the first of three national samples of Gulf War veterans.

### Method

#### Participants and Procedure

Using information supplied by the Department of Defense Manpower Data Center and the Department of Veterans Affairs, a sample was selected in accordance with a stratified random sampling plan. At this point in the test development

<sup>1</sup>Requests for the DRRI may be sent to dawne.vogt@va.gov.

TABLE 1  
Construct Definitions and Sample Items for the 14 DRRI Measures

Construct	Construct Definition	Sample Items	Response Format
Preadjustment/prior stressors	Exposure to traumatic events before deployment, such as community or domestic violence, physical assault, sexual abuse, or other highly stressful life events	Before I was deployed, I experienced ... ... a serious operation ... the death of someone close to me	Dichotomous items (0 = no, 1 = yes)
Childhood family environment	Quality of early life in the family in terms of cohesion, accord, and closeness among family members	People in my family did things together Family members avoided each other	5-point Likert scale (1 = almost none of the time, 5 = almost all of the time)
Deployment/war-zone factors	Extent to which an individual perceives that he or she was prepared for deployment. This includes the extent to which military personnel believe they had the equipment and supplies they needed, were trained to perform necessary procedures and tasks, and were prepared for what to expect during the deployment	I had all the supplies and equipment I needed to get my job done I was well trained on how to use my equipment	5-point Likert scale (1 = strongly disagree, 5 = strongly agree)
Difficult living and working environment	Exposure to events or circumstances representing repeated or day-to-day irritations and pressures related to life in the war zone. These personal discomforts or deprivation may include the lack of desirable food, uncomfortable climate, cultural difficulties, inadequate equipment, and long workdays	The climate was extremely uncomfortable I got as much sleep as I needed	5-point Likert scale (1 = almost none of the time, 5 = almost all of the time)

(continued)

TABLE 1 (Continued)

Construct	Construct Definition	Sample Items	Response Format
Concerns about life and family disruptions	Worries that deployment might negatively affect other important life domains, including both career-related concerns (perhaps especially important for members of the National Guard and Reserves) and family-related concerns	While I was deployed, I was ... losing my job or my business ... harming my relationship with my spouse or significant other	4-point Likert scale (1 = not at all, 4 = a great deal), with an additional option of 0 = not applicable
Deployment social support	Amount of assistance and encouragement in the war zone from the military in general, unit leaders, and other unit members	My unit was like family to me The commanding officer(s) in my unit were supportive of my efforts	5-point Likert scale (1 = strongly disagree, 5 = strongly agree)
General harassment	Exposure to harassment that is nonsexual but that may occur on the basis of one's biological sex or minority or other social status. Categories of harassment include deliberate sabotage, indirect threats, constant scrutiny, and gossip and rumors	While I was deployed, unit leaders ... treated me in an overly critical way ... treated me as if I had to work harder than others to prove myself	4-point Likert scale (1 = never, 4 = many times)
Sexual harassment	Exposure to unwanted sexual touching or verbal conduct of a sexual nature from other unit members, commanding officers, or civilians in the war zone that creates a hostile working environment	While I was deployed, unit leaders ... gossiped about my sex life or spread rumors about my sexual activities ... made crude and offensive sexual remarks directed at me, either publicly or privately	4-point Likert scale (1 = never, 4 = many times)
Perceived threat	Fear for one's safety and well-being in the war zone, especially as a response to potential exposure to circumstances of combat, including fear of NBCs, missiles, and friendly fire incidents	I thought I would never survive I felt that I was in great danger of being killed or wounded	5-point Likert scale (1 = strongly disagree, 5 = strongly agree)
Combat experiences	Exposure to stereotypical warfare experiences such as firing a weapon, being fired on, witnessing injury and death, and going on special missions and patrols that involve such experiences	While deployed ... I went on combat patrols or missions ... my unit engaged in battle in which it suffered casualties	Dichotomous items (0 = no, 1 = yes)
Aftermath of battle	Exposure to the consequences of combat, including observing or handling human remains, dealing with POWs, and observing other consequences such as devastated communities and homeless refugees	I saw refugees who had lost their homes and belongings as a result of battle I was exposed to the sight, sound, or smell of dying men and women	Dichotomous items (0 = no, 1 = yes)
NBC exposures <sup>a</sup>	Endorsed exposures to an array of nuclear, biological, and chemical agents that the veteran believes he or she encountered while serving in the war zone	While I was deployed, I was exposed to ... ... smoke or other air pollution ... depleted uranium in munitions	Polynomial items (0 = no, 1 = don't know, 2 = yes)
Postdeployment/postwar factors	The extent to which family, friends, coworkers, employers, and community provide emotional sustenance and instrumental assistance	The reception I received when I returned from my deployment made me feel appreciated for my efforts I am carefully listened to and understood by family members or friends	5-point Likert scale (1 = strongly disagree, 5 = strongly agree)
Postdeployment stressors	Exposure to stressful life events after the deployment, including both generally stressful events that are unrelated to the deployment and events that may be related to efforts at reintegration (especially for National Guard and Reserves)	Since returning home, I have ... had problems getting access to adequate health care ... been left by a partner or significant other	Dichotomous items (0 = no, 1 = yes)

Note. DRRI = Deployment Risk and Resilience Inventory; NBC = nuclear, biological, or chemical agent. <sup>a</sup>The assessment of perceived NBC exposures was incorporated into the inventory of risk and resilience for the mail survey (Part 3) and for the validation (Part 4) portions of the study.

process, there was no attempt to mirror the distribution of strata within the population of veterans. Rather, the goal was to achieve a sample that varied on war-zone experiences and thus enhance dispersion for psychometric analyses. Stratification according to representativeness of the population was sought in the sample supplying later validation data (Part 4). This Part 2 sample first was stratified on duty status prior to deployment: active-duty personnel (50%) versus National Guard and Reserve personnel (50%). Within these groups, the sample then was stratified on whether the respondent had participated in a health registry program, either the Department of Veterans Affairs's Gulf Registry Health Examination Program or the similar Comprehensive Clinical Evaluation Program initiated by the Department of Defense: registry (50%) versus nonregistry (50%). Within each of these four cells, the sample further was stratified on gender: 75% men and 25% women.

Data collection was implemented by a professional telephone survey organization with extensive experience in national surveys of veteran populations. Two weeks prior to telephone contact, veterans received a letter informing them that they would be approached by telephone in the near future. This letter explained the purpose of the study, assured confidentiality, emphasized the voluntary nature of participation, provided a mechanism to withdraw prior to the telephone call, and otherwise conformed to standards for the protection of human participants. Participants then were called by a trained interviewer. If the participant consented, this was noted in writing by the interviewer, who then proceeded with the questions. Interviews were rescheduled if necessary. Any refusals were noted, and no further contact was made with those individuals. Interviews lasted approximately 45 min. Responses were directly entered into a database using computer-assisted telephone interview technology.

Of those veterans who were successfully contacted, the participation rate was 92%. In the end, we obtained a sample ( $n = 357$ ) that approximated the desired stratification characteristics. The first two columns of Table 2 present a profile of this initial sample.

### Analyses

Classical test-theory-oriented item and scale characteristics (Aiken, 1994; Anastasi, 1982; Nunnally & Bernstein, 1994) were computed for each DRRRI measure. For items with multipoint Likert-type response formats (e.g., *strongly disagree to strongly agree*), frequency distributions and descriptive statistics first were calculated. For dichotomous items (e.g., *yes-no* responses), the probabilities of endorsement, or the proportion of respondents providing an affirmative response, were calculated. Finally, corrected item-total correlations, the correlations of each item's score with the sum of scores on all other items measuring that construct, were computed.

TABLE 2  
Sample Characteristics

Variable	Part 2: First Psychometric Study: Telephone Survey		Part 3: Second Psychometric Study: Mail Survey		Part 4: Validation Component	
	n	%	n	%	n	%
Gender						
Female	80	22	83	26	86	24
Male	277	78	234	74	271	76
Total	357		317		357	
Age group						
20-30	28	8	7	2	26	7
31-40	141	40	123	39	124	35
41-50	103	29	97	31	98	27
51-60	68	19	80	25	91	26
> 60	16	4	10	3	16	5
Total	356		317		355	
Ethnicity						
Hispanic	17	5	45	14	19	5
Non-Hispanic	339	95	267	86	337	95
Total	356		312		356	
Race						
Pacific Islander	2	1	2	1	1	0
American Indian/American Native	7	2	7	2	5	1
Asian	4	1	2	1	2	1
Black/African American	70	20	48	15	55	15
White	261	76	233	74	289	82
Biracial/other	1	0	22	7	2	1
Total	345		314		354	
Branch of military						
Marines	23	6	19	6	19	5
Army	266	75	245	77	277	77
Navy	35	10	17	5	20	6
Air Force	31	9	32	10	39	11
Coast Guard	2	1	1	0	2	1
Total	357		314		357	
Predeployment duty status						
Active duty	172	51	81	26	238	67
National Guard/Reserves	167	49	230	74	119	33
Total	339		311		357	
Registry status						
Registry	171	48	226	71	52	15
Nonregistry	186	52	91	29	305	85
Total	357		317		357	

Note. There is no overlap among the three samples. Each represents a unique and separate group of participants. Percentages do not always add to 100 due to rounding. For the Part 3 sample, 2 participants provided no demographic information, hence, maximum sample size shown is 317.

We used several guidelines in our selection of the best items to assess each risk and resilience factor. Items having a more symmetric response distribution generally were preferred over items having a skewed distribution. The exception was items describing low-incidence events (e.g., a sexual assault) that seemed important to include because of the potential impact on health. In general, items with higher item-total correlations took precedence over those with lower item-total correlations. For certain constructs, however, especially those based on discrete stressor events that are not necessarily expected to covary (e.g., being in an automobile accident and being assaulted), content relevance and breadth were considered more critical to item retention than the item-total correlation. Items with the poorest characteristics were eliminated, with the goal of trimming each measure to achieve an average of approximately 15 items per scale.

## Results and Discussion

The left side of Table 3 presents information on the numbers of items and estimates of internal consistency reliability for each DRR1 measure at the close of this first-stage psychometric survey. Each of the DRR1 measures demonstrated reasonable to excellent values for coefficient alpha, suggesting that the item sets developed in Part 1 were good indicators of their respective constructs. Eleven of the coefficients were .82 or higher, and nine were .85 or higher. Importantly, those risk and resilience variables that may be judged to have causal indicators (Bollen & Lennox, 1991; P. Cohen, Cohen, Teresi, Marchi, & Velez, 1990; MacCallum & Browne, 1993), such as prior stressors and postdeployment stressors, also tended to have the lowest internal consistency estimates, in accordance with the literature on the assessment of stressful life events (Netland, 2001; Vogt et al., 2004). The number of items for the measures ranged from 7 to 23, with an average of just over 15. Individual item characteristics from this particular telephone interview phase of the study are available from the first author on request.

## PART 3: SECOND PSYCHOMETRIC STUDY: MAIL SURVEY

In this section, we describe a second psychometric study aimed at further refining the DRR1 measures and establishing estimates of reliability. In this case, however, the DRR1 was converted to a paper-and-pencil version of the same measures, which was then amenable to distribution as a mailed questionnaire. Moreover, instructions and items in the first version of the inventory (the Part 2 telephone survey) had wording that was specific to the Gulf War deployment. The new paper-and-pencil form of the inventory was intended to be generic and adaptable to any future deployment. Thus, we rephrased instructions and substituted wording to

TABLE 3  
Estimates of Internal Consistency Reliability at Close of Parts 2 and 3

DRR1 Measure	Part 2: First Psychometric Study: Telephone Survey		Part 3: Second Psychometric Study: Mail Survey	
	No. of Items	$\alpha$	No. of Items	$\alpha$
Prior stressors	20	.67	15	.75
Childhood family environment	15	.89	15	.92
Preparedness	14	.82	14	.87
Difficult living and working environment	21	.87	20	.89
Concerns about life and family disruptions	14	.87	14	.89
Deployment social support	12	.91	12	.94
General harassment	7	.90	7	.92
Sexual harassment	7	.88	7	.86
Perceived threat	15	.86	15	.89
Combat experiences	20	.85	15	.85
Aftermath of battle	17	.86	15	.89
NBC exposures <sup>a</sup>	—	—	20	.82
Postdeployment social support	15	.84	15	.87
Postdeployment stressors	23	.69	17	.72

*Note.* Responses to items for variables such as prior stressors and postdeployment stressors may be considered causal indicators of their respective constructs. Hence, covariance among these items is not expected to be particularly high, and estimates of internal consistency reliability, therefore, may be less than those expected for variables with effect indicators (see Bollen & Lennox, 1991; P. Cohen, Cohen, Teresi, Marchi, & Velez, 1990; MacCallum & Browne, 1993; Netland, 2001; Vogt, King, & King, 2004). DRR1 = Deployment Risk and Resilience Inventory; NBC = nuclear, biological, or chemical agent.

<sup>a</sup>The assessment of perceived NBC exposures was incorporated into the inventory of risk and resilience for the mail survey (Part 3) and for the validation (Part 4) portions of the study.

remove references specific to the Gulf War. That is, references to "the Gulf War" in Part 2 became references to "the deployment" in Part 3. A new sample of Gulf War veterans supplied data for this part.

## Method

### Participants and Procedure

For this portion of the study, our sampling pool consisted of 495 Gulf War veterans from across the country who were solicited to participate in the previously conducted telephone interviews—and had expressed a willingness to participate—but were not interviewed because a very high response rate to the invitation for telephone interviews made their participation unnecessary. Of the 495 questionnaires mailed to potential participants, the U.S. Postal Service returned 17 without a for-



warding address, perhaps due in part to the 1-year interval between initial contact and solicitation for the mail survey. In total, 319 (67%) returned completed questionnaires. The demographic and background characteristics of participants in this paper-and-pencil/mail survey component are presented in the middle two columns of Table 2. Unlike the sample for the prior telephone survey, the Part 3 mail survey participants comprised a convenience sample with no conformity to an a priori stratification scheme. We employed Mangione's (1998) multistep method to optimize responses to mailed questionnaires.

### Analyses

Classical test-theory-oriented item and scale characteristics again were computed (Aiken, 1994; Anastasi, 1982; Nunnally & Bernstein, 1994). Special emphasis was placed on the estimate of internal consistency reliability for each of the risk and resilience measures, but with ongoing attention to the content relevance and content breadth of each item set.

### Results and Discussion

The right side of Table 3 provides the numbers of items and estimates of internal consistency reliability for the DRRRI measures. Once more, findings indicate that values of coefficient alpha were quite good, given the relative brevity of each measure. Internal consistency estimates for 12 of the measures were .82 or higher; 7 coefficients were .89 or higher. In addition, the measures with lower internal consistency estimates reference constructs based on discrete stressor events that are not necessarily expected to covary (Bollen & Lennox, 1991; P. Cohen et al., 1990; MacCallum & Browne, 1993; Netland, 2001; Vogt et al., 2004). Furthermore, the measures demonstrated similar, and slightly higher, levels of internal consistency reliability compared to those derived from the analysis of the first-stage telephone survey data. The average number of items per scale was just over 14.<sup>2</sup>

### PART 4: EVIDENCE FOR VALIDITY

Having created a collection of separate content-saturated and internally consistent measures of deployment risk and resilience, we next turned attention to gathering evidence for their validity. In this regard, we sought to identify relations between the risk and resilience factors and physical, neurocognitive, and mental health outcomes reported by Gulf War veterans, with special attention to the types of health complaints that have appeared in the professional and scientific literature since the

<sup>2</sup> Requests for the DRRRI may be sent to dawne.vogt@va.gov.

close of that conflict (e.g., Fukuda et al., 1998; Haley, Kurt, & Hom, 1997; Iowa Persian Gulf War Study Group, 1997; Joseph & CCEP, 1997). In addition, we examined group differences (based on predeployment duty status, health registry status, and gender). The mode of data collection was telephone interview, and yet a third national sample was employed.

### Method

#### Participants and Procedure

As before, we relied on the Department of Defense Manpower Data Center and Department of Veterans Affairs to assist in sample selection. In this instance, the sample was stratified on predeployment duty status (active duty vs. National Guard or Reserves) and health registry status (registry vs. nonregistry) according to their representations in the population of Gulf War veterans. Female veterans were oversampled to yield an approximate 75% men, 25% women gender distribution. We followed the same processes as outlined in Part 2 for contacting veterans and conducting the telephone interviews. We obtained a new sample ( $n = 357$ ) that closely mirrored the planned strata. Of those veterans who were successfully located, the participation rate was 92%; see Table 2 for participant characteristics.

#### Measures

The next sections give descriptions of health outcome measures administered in conjunction with the DRRRI.

**Physical symptoms and conditions.** There is a fairly strong literature that identifies salient symptoms and conditions that appear to be related to military service in the Persian Gulf region, both the findings of important individual studies (e.g., Fukuda et al., 1998; Haley et al., 1997; Iowa Persian Gulf War Study Group, 1997; Joseph & CCEP, 1997) and major compilations by national institutes and commissions (e.g., Institute of Medicine, 1996; Persian Gulf Veterans Coordinating Board, 1996, 1997; Presidential Advisory Committee on Gulf War Veterans' Illnesses, 1996, 1997; Research Working Group of Military and Veterans Health Coordinating Board, 2000, 2001, 2002). Based on a review of this literature, lists of 27 symptoms (e.g., recurrent headaches, muscle pain, and wheezing, shortness of breath, or coughing) and 25 conditions (e.g., chronic fatigue syndrome, gastritis or gastroenteritis, and fibromyalgia or fibrositis) were compiled. Using a dichotomous *yes-no* format, respondents were asked to self-report which physical symptoms they had experienced over the past 3 months (but not prior to or immediately after the war), and for which current (and not preexisting) conditions they had received a diagnosis by a physician or other health professional. A total

symptom count was computed as the sum of endorsed symptoms, and a total condition count was computed as the sum of all current diagnosed conditions.

**Neurocognitive deficits.** A 27-item measure of neurocognitive deficits was also created for this study. Again, relevant literature on Gulf War illnesses in general (e.g., Fukuda et al., 1998; Haley et al., 1997; Iowa Persian Gulf War Study Group, 1997; Joseph & CCEP, 1997) and on neurocognitive problems among Gulf War veterans in particular (e.g., Bourdette et al., 2001; Goldstein, Beers, Morrow, Shemansky, & Steinhauer, 1996; Hom, Haley, & Kurt, 1997; Jamal, Hansen, Apartopoulos, & Peden, 1996; Sillanpaa et al., 1997) was consulted to identify commonly reported problems. Difficulties in concentrating and learning new information, plus changes in memory and executive functioning abilities were the most consistently investigated problem areas. Thus, the resulting neurocognitive deficits measure was comprised of items assessing difficulties in three target domains: attention and concentration (sample item: "focusing on tasks when too much detail or clutter was present"), executive functioning (sample item: "doing things in the correct order"), and memory (sample item: "remembering things someone has asked you to do"). The items for each of these domains reflect functional problems that can develop secondary to changes in brain functioning. A 5-point Likert response scale accompanied each neurocognitive item to evaluate the frequency of occurrence of problems in the particular activity or function. The scaled response options were 1 (*never*), 2 (*1-2 times/month*), 3 (*1-2 times/week*), 4 (*several times/week*), and 5 (*almost everyday*). A total score across all 27 items was computed. The estimate of internal consistency reliability was .98 for this sample.

**CDC multisymptom illness.** Fukuda et al. (1998) at the Centers for Disease Control and Prevention (CDC) set forth what they characterized as a case definition and criteria for multisymptom illness in Gulf War veterans. According to the case definition, an individual must have one or more chronic symptoms from at least two of three categories: fatigue, mood-cognition, and musculoskeletal. We incorporated the CDC multisymptom illness case definition in our work. Endorsement of the symptom excessive tiredness assessed the fatigue category. The mood-cognition category was indexed by the symptoms of excessive moodiness, excessive irritability, and recurrent sleep disturbances, and by average item scores of 2 or above (1-2 times/week or more often) on the attention and concentration and memory items from the neurocognitive deficits measure. The symptoms loss of muscle strength, muscle pain, or muscle exhaustion and joint pain or stiffness were used to assess the musculoskeletal category. All symptoms had to have occurred after the Gulf War and in the prior 3 months. In accordance with the CDC criteria, a dichotomous (0/1) caseness variable was operationalized as endorsement of at least one symptom from at least two of these categories.

**PTSD.** We also included a measure of PTSD symptom severity that is specific to reactions to stressful military experiences. This measure, the PTSD Checklist (Weathers, Litz, Herman, Huska, & Keane, 1993), contains 17 items directly adapted from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994) to evaluate PTSD's Criteria B (reexperiencing and intrusive thoughts and memories), C (active avoidance and emotional numbing), and D (hyperarousal) symptom categories. Respondents rated on a 5-point scale, with anchors ranging from 1 (*not at all*) to 5 (*extremely*), how much "you have been bothered by that problem in the past month." This well-regarded and widely used brief screening instrument for stress symptomatology has demonstrated coefficient alphas greater than .95, and is highly correlated with one of the most well-accepted measures of PTSD, the Clinician-Administered PTSD Scale (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). The coefficient alpha for this sample was .96.

**Depression.** A 7-item measure of depression was adapted from the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This abbreviated scale (BDI-PC) has been used to reliably assess affective and cognitive symptoms of depression among medical patients (Beck, Steer, Ball, Ciervo, & Kabat, 1997). Items were rated on a 5-point scale with anchors ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include "In the last 3 months, I have felt like a failure" and "In the last 3 months, I have had thoughts of killing myself." The full BDI has been found to demonstrate coefficient alphas in the range of .81 to .86 and to correlate well with clinicians' ratings of severity of depression (Beck, Steer, & Garbin, 1988). The coefficient alpha for this abbreviated version of the instrument in this sample was .91.

**Anxiety.** Anxiety was assessed by 7 items drawn from the Beck Anxiety Inventory (BAI; Beck & Steer, 1990). This abbreviated scale (BAI-PC) has demonstrated reliability and validity for assessing subjective anxiety among both inpatients and outpatients (Beck et al., 1997). Again, a 5-point response scale was used, with anchors ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include "In the last 3 months, I have been unable to relax" and "In the past 3 months, I have had a fear of losing control." The full scale has demonstrated quite acceptable internal consistency, a coefficient alpha of .92, and is highly correlated with other measures of anxiety (Beck, Epstein, Brown, & Steer, 1988). The coefficient alpha for this 7-item version of the instrument was .90 in this sample.

### Analyses

Data were analyzed using the STATA software package (StataCorp, 1999), which incorporated sample design weights, the inverse probabilities of selection.

These weights corrected parameter estimates for the oversampling of female veterans, and the identification of strata enabled STATA to calculate the appropriate standard errors. In total, there were eight strata: 2 (predeployment duty status)  $\times$  2 (registry status)  $\times$  2 (gender). In addition to descriptive statistics for the major variables and bivariate correlations between the risk and resilience factors and health outcomes, we also compared scores on the risk and resilience factors for groups based on predeployment duty status, registry status, and gender. For time-efficient administration of the DRRI and the health outcomes via telephone, a planned missingsness variation of Graham, Hofer, and MacKinnon's (1996) X-A-B-C design was used, followed by multiple imputation strategies for incomplete data (Schafer, 1997). In this study, we expanded the Graham et al. model to an X-A-B-C-D design, with a resulting six patterns of item presentation. A total of 10 imputations were employed, and summary findings were derived using formulas provided by Rubin (1987).

## Results and Discussion

### *Descriptive Statistics and Bivariate Associations*

Table 4 provides basic descriptive statistics for all measures, the 14 risk and resilience factors together with the 7 health outcomes. From the means, standard deviations, and ranges reported there, the distributions of scores on the DRRI measures appear to be skewed to some greater or lesser extent. Nonetheless, there is generally good dispersion, as reflected in the values for the standard deviations, which endorses each measure's capability to document individual differences on its respective variable. The scores on measures of health outcomes likewise appear to be somewhat skewed, to be expected with indicators of health in a community sample.

Of more interest are the correlations between DRRI scores and scores on the health outcomes (Table 5). The large majority of these correlations attained statistical significance ( $p < .01$ ) and, with one exception (the close-to-zero association between childhood family environment and CDC multisymptom illness), were in the expected directions. For ease of interpretation, correlations that equal or exceed what might be considered a modest effect size (small to medium; J. Cohen, 1988) of  $r = .20$  are depicted in italics in Table 5, and those that equal or exceed an effect size in the moderate range of  $r = .35$  (J. Cohen, 1988) are presented in bold.

Overall, it appears that the associations between the risk and resilience factors and mental health outcomes (PTSD, depression, and anxiety) are stronger than those between the risk and resilience factors and either physical health outcomes (symptoms, conditions, and CDC multisymptom illness) or neurocognitive deficits. This is not a surprising finding because the risk and resilience factors are largely psychosocial in nature and might be expected to impact mental health more

TABLE 4  
Scale Characteristics for the Validation Component (Part 4)

Variable	No. of Items	M	SD	Range
Risk and resilience factors				
Prior stressors	15	4.57	2.71	0-13
Childhood family environment	15	57.38	9.54	19-75
Preparedness	14	48.66	9.93	17-68
Difficult living and working environment	20	58.15	13.75	28-92
Concerns about life and family disruptions	14	28.33	8.76	14-52
Deployment social support	12	44.91	9.97	12-60
General harassment	7	12.21	4.94	7-28
Sexual harassment	7	7.90	1.39	7-25
Perceived threat	15	47.37	11.13	20-74
Combat experiences	15	3.99	3.24	0-14
Aftermath of battle	15	5.99	4.11	0-15
NBC exposures	20	21.63	6.72	4-37
Postdeployment social support	15	60.53	9.25	24-75
Postdeployment stressors	17	3.86	2.75	0-13
Health outcomes				
Count of symptoms	27	6.34	5.77	0-24
Count of conditions	25	1.99	2.64	0-13
CDC multisymptom illness	-	0.54 <sup>a</sup>	0.53	0-1
Neurocognitive deficits	27	58.03	26.10	27-130
PTSD	17	33.26	16.21	17-80
Depression	7	18.12	7.20	7-35
Anxiety	7	16.82	7.70	7-35

Note. NBC = nuclear, biological, or chemical agent; CDC = Centers for Disease Control; PTSD = posttraumatic stress disorder.

<sup>a</sup>This value represents the percentage of people who endorsed the condition.

immediately and directly. Within the mental health category specifically, there is a tendency for the largest correlations to be with PTSD, but closely followed by correlations with depression and anxiety. Also noteworthy are several associations between lower magnitude deployment stressors and mental health. For example, the relation of difficult living and working environment with PTSD, depression, and anxiety is reminiscent of findings earlier reported by D. W. King et al. (1995) and Litz et al. (1997), supporting the importance of day-to-day discomforts, deprivations, and hassles that characterize conditions often experienced in overseas deployments or other hazardous duty assignments. Similarly, another stressor of relatively low magnitude, concerns about life and family disruptions, was modestly to moderately related to the mental health outcomes, endorsing the DRRI's ability to index salient dimensions likely predictive of postdeployment distress and suggesting that attention to worries about home and family (e.g., Johnson et al., 1992; Malone et al., 1996; Ryan-Wenger, 1992) merits future study.



events (Brewin et al., 2000; D. W. King et al., 1999; D. W. King et al., 1995; Ozer, Best, Lipsey, & Weiss, 2003), and these DRR1 findings are in agreement with this perspective. Relatedly, these findings may suggest a neuroticism factor at work to some extent (e.g., Costa & McCrae, 1995). It is conceivable that neuroticism is a spurious variable in this research, one that is unmeasured but potentially causal of both the responses on the DRR1 and responses to measures of well-being.

Finally, 11 of the 14 DRR1 measures correlated modestly to moderately with the index of neurocognitive deficits, the strongest being the association with post-deployment stressors, followed closely by the association with perceived threat.

### Group Differences

Tables 6 through 8 present results of group comparisons on the DRR1. For each contrast, we report group means and standard deviations, values of the test statistic *t*, and 90% confidence intervals for an effect size estimate, here a correlation between group membership and score on the measure (Rosenthal, Rosnow, & Rubin, 2000; Schmidt, 1996; Thompson, 1996).

Table 6 depicts the results of comparisons based on predeployment duty status. Considering the strongest effects, differences in these groups were in the direction

TABLE 6  
Comparisons Between Veterans Deployed From Active Duty and Veterans Deployed From National Guard/Reserve Units

Risk and Resilience Factors	Active Duty <sup>a</sup>		National Guard/Reserves <sup>b</sup>		<i>t</i>	ES (90% CI)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Prior stressors	4.79	2.70	4.11	2.66	2.21*	.03-.21
Childhood family environment	57.73	9.80	56.68	9.07	1.00	-.04-.14
Preparedness	48.02	10.62	49.94	8.50	-1.85	.01-.19
Difficult living and working environment	59.98	14.46	54.48	12.20	3.76**	.12-.28
Concerns about life and family disruptions	28.45	9.15	28.09	7.92	0.39	-.07-.11
Deployment social support	44.05	13.52	46.66	9.08	-2.43*	.04-.22
General harassment	12.58	5.15	11.46	4.39	2.13*	.02-.20
Sexual harassment	8.00	1.55	7.71	1.10	2.02*	.03-.22
Perceived threat	48.29	11.27	45.50	10.81	2.25*	.05-.23
Combat experiences	4.29	3.35	3.40	3.01	2.50*	.04-.22
Aftermath of battle	6.42	4.25	5.12	3.87	2.89**	.06-.24
NBC exposures	22.88	6.29	19.14	7.57	4.63**	.16-.32
Postdeployment social support	60.31	9.89	60.99	7.86	-0.70	-.05-.13
Postdeployment stressors	4.03	2.70	3.52	2.77	1.62	-.00-.18

Note. ES = effect size; CI = confidence interval; NBC = nuclear, biological, or chemical agent.  
<sup>a</sup>*n* = 238. <sup>b</sup>*n* = 119.  
 \**p* < .05. \*\**p* < .01.

TABLE 7  
Comparisons Between Veterans Listed on Health Registry and Veterans Not Listed on Health Registry

Risk and Resilience Factors	Registry <sup>a</sup>		Nonregistry <sup>b</sup>		<i>t</i>	ES (90% CI)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Prior stressors	4.58	2.71	4.56	2.68	0.04	-.10-.1
Childhood family environment	55.66	8.63	57.67	9.71	-1.52	-.01-.1
Preparedness	48.60	10.47	48.66	9.81	-0.04	-.09-.0
Difficult living and working environment	57.20	15.36	58.31	13.51	-0.48	-.06-.1
Concerns about life and family disruptions	27.00	8.90	28.55	10.43	-1.15	-.03-.1
Deployment social support	47.01	8.75	44.57	10.18	1.80	.01-.1
General harassment	11.45	4.78	12.33	5.00	-1.23	-.02-.1
Sexual harassment	7.97	1.18	7.89	1.39	0.42	-.08-.1
Perceived threat	48.06	9.66	47.25	11.38	0.54	-.06-.1
Combat experiences	4.69	3.55	3.88	3.24	1.52	-.01-.1
Aftermath of battle	6.19	4.01	5.96	4.16	0.38	-.07-.1
NBC exposures	21.59	7.53	21.64	6.57	-0.05	-.09-.0
Postdeployment social support	60.77	8.40	60.49	9.34	0.22	-.08-.1
Postdeployment stressors	4.79	3.17	3.71	2.68	2.31*	.03-.2

Note. ES = effect size; CI = confidence interval; NBC = nuclear, biological, or chemical agent.  
<sup>a</sup>*n* = 52. <sup>b</sup>*n* = 305.  
 \**p* < .05.

of personnel deployed from active-duty units reporting more stressful experiences in the Gulf region than those deployed from National Guard or Reserve units. Of particular note are the group differences on aftermath of battle, difficult living and working environment, and reported NBC exposures.

Table 7 presents findings related to differences between veterans who were on one of the two health registries and those who were not a part of the registry program. In contrast to the prior results, differences between these two groups were negligible, with the possible exception of a small effect for postdeployment stressors. A higher number of stressors after return from the war were reported by registry veterans.

Table 8 itemizes gender-based contrasts. The means for men were larger than those for women on six risk and resilience measures: childhood family environment (where higher scores indicate a positive environment), preparedness, combat experiences, deployment social support, NBC exposures, and postdeployment social support. The means for women exceeded the means for men on difficult living and working environment and sexual harassment. Thus, men and women tended to endorse different types of stressors, highlighting the importance of examining gender in future explorations of the impact of war-zone stressors on health and well-being. A more complete examination of gender differences in deployment

TABLE 8  
Comparisons Between Men and Women

Risk and Resilience Factors	Men <sup>a</sup>		Women <sup>b</sup>		t	ES (90% CI)
	M	SD	M	SD		
Prior stressors	4.56	2.53	4.67	2.85	-0.30	-.08-.12
Childhood family environment	57.80	8.80	51.83	12.57	4.08**	.12-.29
Preparedness	49.29	9.15	40.22	11.10	6.82**	.27-.43
Difficult living and working environment	57.80	12.72	62.72	14.29	-2.85**	.06-.23
Concerns about life and family disruptions	28.42	8.10	27.17	8.84	1.15	-.03-.15
Deployment social support	45.46	9.23	37.70	12.28	5.39**	.20-.36
General harassment	12.10	4.53	13.72	5.55	-2.46**	.04-.22
Sexual harassment	7.79	1.22	9.41	3.39	-4.29**	.14-.31
Perceived threat	47.19	10.28	49.69	10.95	-1.86	.01-.19
Combat experiences	4.13	3.05	2.18	1.96	6.81**	.27-.43
Aftermath of battle	6.05	3.83	5.12	3.54	2.10*	.02-.20
NBC exposures	21.80	6.27	19.49	6.04	3.03**	.07-.24
Postdeployment social support	60.76	8.54	57.46	10.70	2.60**	.05-.22
Postdeployment stressors	3.84	2.53	4.13	2.41	-0.95	-.04-.14

Note. ES = effect size; CI = confidence interval; NBC = nuclear, biological, or chemical agent.

<sup>a</sup>n = 271, <sup>b</sup>n = 86.

\*p < .05. \*\*p < .01.

risk and resilience factors using DRRI data on another sample is provided by Vogt, Pless, King, and King (2005).

## SUMMARY AND CONCLUSIONS

This article reports a four-phase process for developing an instrument to assess risk and resilience factors that may have implications for military personnel and veterans' mental and physical health, functioning, and general adjustment following deployment to a war zone or other hazardous region. The resulting instrument, the DRRI,<sup>3</sup> contains 14 measures assessing features of predeployment instrument, the deployment-related experiences and perceptions, and postdeployment events and circumstances. The wording of items was intended to be appropriate for most contemporary military deployments, and the instrument has been successfully used in both telephone and mail survey formats.

The early psychometric evidence for the DRRI is encouraging and suggests that it has promise for reliably assessing risk and resilience factors that contribute to military personnel and veterans' well-being. The application of a focus group

methodology to inform both the definitions of risk and resilience factors and the generation of items to assess these factors contributed to content validity, a critical form of evidence for the overall psychometric quality of a test (Haynes, Richard, & Kubany, 1995; Vogt et al., 2004). Furthermore, the DRRI scales were internally consistent for both telephone and mail forms of administration, suggesting that both are acceptable modes of collecting data. Moreover, demonstrated associations with key health outcomes as well as the ability to detect differences between veteran subgroups offer support for the validity of the measures.

Each of the measures in the DRRI may be considered as a stand-alone instrument. That is, any one or more of the DRRI measures may be used individually, apart from the full inventory, depending on the needs of the researcher. The measures are intended to identify deployment-related factors that either put veterans at risk for postdeployment symptomatology or that serve a protective function. Information generated from the administration of DRRI measures can also facilitate better understanding of the special training and preparedness needs of personnel facing the challenges presented by modern military operations. To the extent that we have a sound understanding of factors that underlie health-related sequelae of military deployments, we are better able to formulate techniques aimed at stress inoculation. From a postdeployment or postmilitary perspective, the use of the DRRI can contribute to a better understanding of veterans' health and well-being. Postdeployment physical and mental health and quality of life (including social adjustment and occupational attainment) will surely benefit from scientific research that identifies and measures salient military experiences and their long-term consequences.

Again, we recognize that even this 14-dimension inventory is not exhaustive, and there is room for supplementary situational indicators that may be especially pertinent to certain deployment types. In this regard, prior studies (e.g., Bartone, Adler, & Vaitkus, 1998; Litz et al., 1997) have pointed to the importance of boredom and role ambiguity as major stressors in peacekeeping operations. Additionally, studies using the DRRI in samples of military personnel in recent deployments to Iraq and Afghanistan are needed, and several are currently underway by Department of Defense and Department of Veterans Affairs research teams.

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<sup>3</sup>Requests for the DRRI may be sent to dawnc.vogt@va.gov.

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## An Empirical Method of Determining Employee Competencies/KSAOs From Task-Based Job Analysis

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This article demonstrates a new, less subjective approach to determining employee competencies and KSAOs from task-based job analytic procedures. Incumbents rated tasks on their significance, which was a combination of importance and amount of time spent on the task, and in terms of the level of difficulty they personally experienced in completing the task, relative to other tasks. The relative difficulty ratings were interpreted as reverse-keyed ratings of incumbents' levels of proficiency on each task. Subjecting the task difficulty ratings of the most significant tasks to principal components analysis served to identify the competencies underlying task performance. The procedure was applied to the responses of 117 first-line public sector supervisors to a 307-item, task-based job analysis survey instrument and resulted in 6 meaningful competencies or KSAOs.

The purpose of this article is to demonstrate a new approach to inferring employee competencies (i.e., knowledge, skills, abilities, and other personal characteristics [KSAOs]) from task-based job analytic procedures such as (but not limited to) TI/CODAP (Christal & Weissmuller, 1988). TI/CODAP is the predominant job analysis procedure used in military and government organizations. Our procedure began with a task-based job analysis followed by a series of empirical analyses aimed at determining competencies or KSAOs that underlie the tasks. To the best of our knowledge, the approach used in this study represents a new contribution to the research on the linkage of competencies or KSAOs to task-based job analysis results. This work focused on a task-based job analytic approach because of its

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