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The Comprehensive Soldier and Family Fitness Program Evaluation. Report #4: Evaluation of Resilience Training and Mental and Behavioral Health Outcomes

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April 2013




COMPREHENSIVE SOLDIER & FAMILY FITNESS

BUILDING RESILIENCE ★ ENHANCING PERFORMANCE

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Executive Summary

The purpose of this evaluation is to examine the effectiveness of Master Resilience Training, which is a pillar of the Comprehensive Soldier and Family Fitness (CSF2) program. The report evaluates the relationship between resilience training and diagnoses for mental health or substance abuse problems and whether this relationship was mediated by Soldiers' self-reported resilience/ psychological health (R/PH). In other words, we tested whether Soldiers with MRT trainers in their units experienced increases in self-reported R/PH, and whether increases in self-reported R/PH were associated with reduced odds of Soldiers receiving diagnoses for mental health or substance abuse problems.

The results revealed that exposure to resilience training increased various aspects of Soldier R/PH, which, in turn, appeared to be associated with a reduced likelihood of receiving a diagnosis for a mental health problem (i.e., anxiety, depression, or posttraumatic stress disorder [PTSD]). Thus, this finding suggested that the reduced odds of receiving a diagnosis for a mental health problem was partly due to increases in indicators of R/PH that were likely associated with exposure to resilience training. Moreover, the findings provided evidence that Soldiers exposed to the training were diagnosed with substance abuse problems at a significantly lower rate than Soldiers who were not exposed to the training.

Importantly, the results of this evaluation bolster findings from previous evaluations by employing more sophisticated and stringent statistical techniques to demonstrate that resilience training can improve the R/PH of Soldiers. Additionally, the analyses included in this evaluation accounted for the potential effects of Soldier deployment; these considerations were not made in previous evaluations of the program. Therefore, the current evaluation provides further evidence that resilience training may improve the self-reported R/PH of Soldiers, even when controlling for a wider range of factors that might be expected to impact the R/PH of Soldiers.

The findings of this evaluation have a number of implications. First, this evaluation provides some evidence that resilience training may be related to improvements on objective measures of mental and behavioral outcomes (i.e., diagnoses for mental health and substance abuse problems). Second, when considered at the organizational level, the effects of resilience training may reach beyond improving the health of individual Soldiers by improving the aggregate health and effectiveness of the Army as an organization. Given that diagnoses for mental health disorders are a leading cause for hospitalization in the Armed Forces (Armed Forces Health Surveillance Center, 2012b), the findings provide evidence that interventions such as those offered by CSF2 may help relieve the stress that is currently being placed on medical services in the Army. In sum, it appears that the improvement of R/PH through resilience training efforts can protect against problems that undermine the effectiveness and efficiency of the Army.

As with any large-scale evaluation of this type, there are a number of limitations to be acknowledged. First, the timing of deployment cycles of Soldiers in the eight Brigade Combat Teams (BCTs) that were examined introduced potential confounds with regard to the timing of resilience training and data collection efforts for use in this

report. Specifically, it appeared that the timing of deployments was such that Soldiers with MRTs in their units were more likely to have been deployed to combat than were those who had no MRT trainers in their units. This means that Soldiers who received resilience training were also more likely to have experienced combat which likely increased the probability of subsequently experiencing the adverse outcomes examined in this study. While this fact posed a potential confound, statistical controls were put in place that allowed for a meaningful test of the resilience training program's effect on R/PH and diagnoses for mental health and substance abuse problems. Other limitations of this evaluation effort have been described elsewhere (Lester, Harms, Herian, Krasikova & Beal, 2011c) and are expanded upon later in this report.

In light of these limitations, it is important that readers recognize two points when reviewing this report. First, this report builds on previous evaluations of the CSF2 program. Specifically, the analyses used here were more stringent given the nature of the data. It is important to note that, given the more rigorous testing methods, the results of this and previous evaluations are fairly consistent. Second, it is critical to recognize that the findings presented in this report represent the latest effort in an ongoing evaluation of the resilience training program. Future analyses may also be conducted that empirically explore the relationship between resilience training and other objective outcomes. If such analyses are undertaken, it is possible that the results may differ from those presented here and in previous evaluations due to the amount of time that has passed since implementation of the training program. In the end, however, the effectiveness of CSF2 cannot be judged solely on the results of any single evaluation, but instead must be considered in light of the entire body of work done to date.

Introduction

Comprehensive Soldier and Family Fitness (CSF2)[1] represents an organization-wide effort by Army leadership toward enhancing Soldier resilience and psychological health (R/PH). Soldier R/PH has been described as the ability to "bounce back" from stressful events or circumstances while maintaining a stable level of well-being (Cornum, Matthews, & Seligman, 2011; Reivich, 2010). CSF2 operates on the principle that R/PH is not a pre-set or inflexible trait, but instead can be taught, practiced, and developed over time (Reivich, Seligman, & McBride, 2011).

This report presents the evaluation of CSF2 resilience training, an intervention in which Master Resilience Trainers (MRTs) – Noncommissioned Officers (NCOs) who have undergone specialized resilience training – take on the additional responsibilities of providing resilience training to other Soldiers within their units. Thus, CSF2 resilience training relies on a "train-the-trainer" model. The lessons are designed to educate Soldiers in techniques to more effectively deal with stress and maintain healthy relationships, with the overarching goal of enhancing Soldier R/PH across a range of domains. A detailed description of the curriculum used to train MRTs was outlined in a previous report (Lester et al., 2011c) and is briefly described later in this report.

This is the fourth in a series of evaluation reports. The first two reports in the series provided evidence that Soldier R/PH was associated with critical outcomes for both the individual and the organization (Lester et al., 2011a; Lester, Harms, Bulling, Herian, & Spain, 2011b). Specifically, Soldiers who reported higher levels of R/PH, as measured by the Global Assessment Tool (GAT), were less likely to test positive for drug use, commit violent crimes, or commit suicide (Lester et al., 2011b), and were more likely to be promoted or selected for command positions (Lester et al., 2011a). The third report (Lester et al., 2011c) sought to determine whether Soldiers in units with MRT trainers experienced greater increases in R/PH, as measured by the GAT, compared to Soldiers in units that did not have MRT trainers. The evaluation provided evidence that Soldiers in units with MRT trainers reported greater increases in R/PH than did Soldiers who did not receive MRTs in their units.

The current report builds upon the findings of the previous reports – particularly Report #3 (Lester et al., 2011c) – by examining the relationship between exposure to resilience training, Soldier R/PH, and individual-level health outcomes. Specifically, the present evaluation examined whether Soldiers in units with MRTs (referred to in this report as the Training condition) experienced greater increases in R/PH than did Soldiers who did not receive MRTs at the unit level (referred to in this report as the Non-training condition), and whether increases in R/PH were associated with a reduction in the likelihood of being diagnosed with mental health problems (i.e., anxiety, depression, or post-traumatic stress disorder [PTSD]) or substance abuse problems (i.e., drug or alcohol abuse).

We emphasize that resilience training was designed to increase Soldiers' R/PH, which, in turn, is hypothesized to be associated with lower rates of mental health and substance abuse problems. Therefore, mediation

[1] Comprehensive Soldier and Family Fitness was formerly known as Comprehensive Soldier Fitness. The name has changed since the publication of CSF Technical Report #3, and references to the program in this report reflect that change in name.

analysis was used to examine empirical relationships between training and these outcomes via Soldier R/PH. Nonetheless, we did assess the possibility that exposure to MRT training would have direct impacts upon health outcomes by examining the direct relationship between resilience training and diagnoses for mental health and substance abuse problems. Figure 1 depicts the expected relationships between resilience training, Soldier R/PH, and the diagnoses that are considered in this report.

Using this analytic approach, the following evaluation questions were developed:

1) Do Soldiers in units with MRT trainers experience lower rates of mental health problems (i.e., anxiety/depression/PTSD) and substance abuse problems (i.e., alcohol or drug abuse)?

2) Does Soldier R/PH mediate the relationship between resilience training and diagnoses for mental health problems (i.e., anxiety/depression/PTSD)?

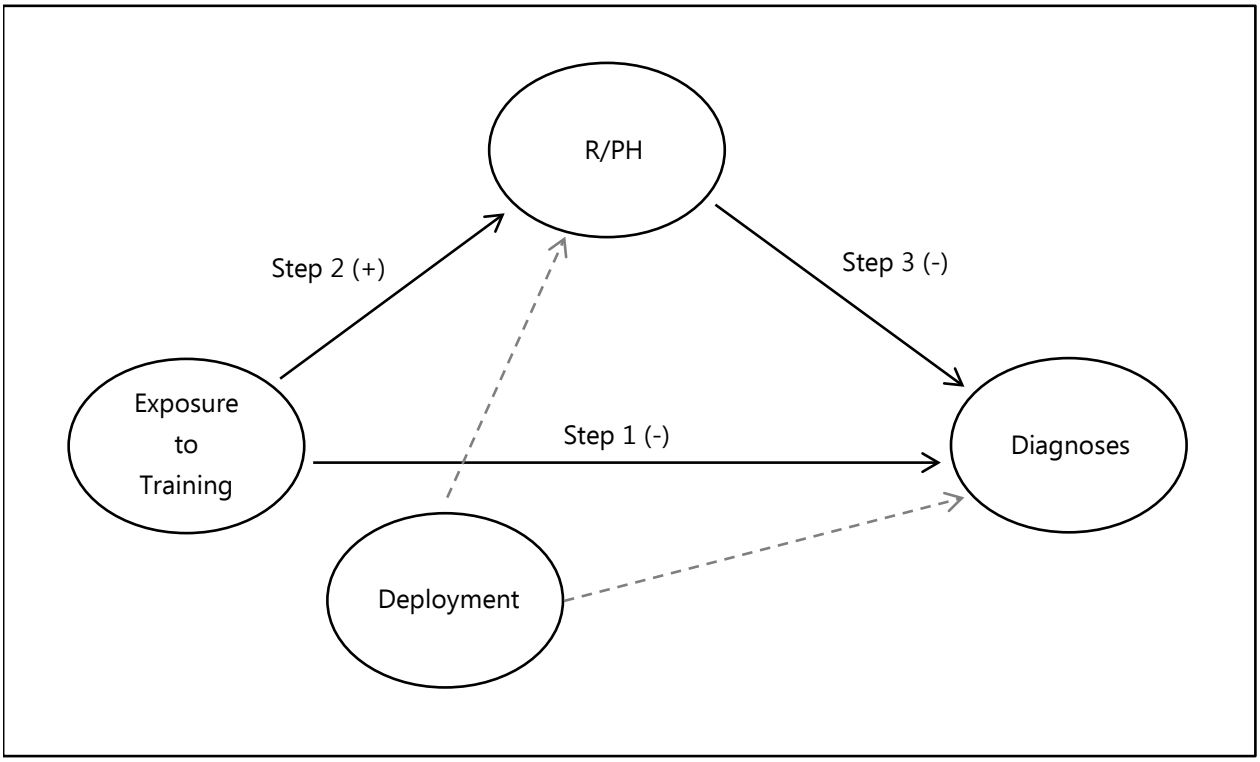
3) Does Soldier R/PH mediate the relationship between resilience training and diagnoses for substance abuse problems (i.e., alcohol or drug abuse)?

There are a number of reasons why these outcomes were chosen for analysis in this evaluation. First, these outcomes represent objective indicators of mental and behavioral health that go beyond the self-reported indicators of R/PH that are measured by the GAT. While self-reported indicators of R/PH measured by the GAT are certainly important, the objective criteria under consideration in the present evaluation expand the pool of outcome measures against which the resilience training program's effectiveness can be assessed. Second, these outcomes – particularly anxiety, depression, and PTSD – represent mental health issues that could be reduced by the skills taught to Soldiers through resilience training. While resilience training was not specifically designed to reduce behavioral problems related to alcohol or drug abuse, these outcomes may indicate the use of maladaptive behavioral responses by Soldiers to the stress regularly faced in Army life. Furthermore, a wide range of cognitive-behavioral interventions have been aimed at substance abuse-related outcomes and have proven somewhat effective. For example, evidence has suggested that other programs in the military context have been effective at reducing drinking among Soldiers (Mulligan et al., 2012).

More broadly, these outcomes were chosen for examination because they represent mental health and behavior-related issues that have important implications for the U.S. Army (Reivich et al., 2011). Psychological problems and substance abuse issues have considerable costs for the organization and may serve to weaken its effectiveness. Moreover, each outcome is detrimental to the individual Soldier, both in the short and long term. Therefore, if resilience training can reduce the probability of each outcome, it would not only provide evidence regarding the efficacy of the CSF2 program, but would also provide evidence regarding strategies that could improve the health of the individual Soldier and the effectiveness and efficiency of the Army, as a whole.

There are three notable results from the evaluation. First, consistent with previous evaluations (Lester et al., 2011c), resilience training was associated with higher R/PH scores of Soldiers. Specifically, Soldiers in the Training condition demonstrated higher

Figure 1. Hypothesized Indirect Relationship between MRT Training and Diagnoses



Notes: The expected direction of each relationship at each step is presented in parentheses. For example, at Step 1, we expected a negative relationship between exposure to resilience training and outcomes; at Step 2, we expected a positive relationship between exposure to resilience training and R/PH; at Step 3, we expected a negative relationship between R/PH and outcomes (diagnoses for mental health and substance abuse problems). The dashed line indicates that we controlled for deployment in our analyses.

levels of adaptability, character, coping, friendship, and optimism than Soldiers in the Non-training condition. Second, evidence suggests that optimism and adaptability mediated the relationship between resilience training and diagnoses for mental health problems. This is an important finding regarding the potential for resilience training to improve the R/PH of Soldiers, and to reduce the incidence of serious mental health problems via improving Soldier R/PH. Third, resilience training appears to be associated with a reduced likelihood that a Soldier would receive a diagnosis for a substance abuse problem.

As we will discuss in greater detail below, the results of the evaluation indicate that the effects of training upon the outcomes under consideration were relatively small, meaning that resilience training will likely result in only a slight reduction in the odds of a Soldier experiencing one of these negative outcomes as a result of the training. However, when a small reduction in the odds of such outcomes is considered in light of the fact that the Army has over one million Soldiers, it is possible to see the potentially far-reaching impact that resilience training might have on the psychological health of the entire Army and those who serve in it.

The skills taught by resilience training may yield benefits far downstream, outside the time frame under examination in this analysis (Bliese, Adler, & Castro, 2011). Therefore, the relative novelty of the resilience training program and the short amount of time that elapsed between the completion of the program and the collection of the data used as outcome variables in this report somewhat limits the extent to which we can draw strong conclusions regarding the program's long-term impacts on R/PH and Soldier health.

The rest of this report is divided into five distinct sections. First, the literature applicable to the Master Resilience Trainer course is reviewed. Second, the data and methods used to conduct the evaluation are described in detail. Third, the results of the evaluation are presented. Fourth, the findings are discussed. Finally, the evaluation concludes with a general statement about the applicability of the findings to CSF2 and the Army more generally.

Review of Literature on Resilience Training Programs

Much of the focus of CSF2 is on the R/PH of Soldiers. While the term "resilience" is conceptualized in a number of different ways in the academic literature, the term broadly refers to an individual's capacity to maintain a functional equilibrium or display positive adaptation following, or in spite of, risks to normal development or psychological health (Bonanno, 2004; Masten, 2001, 2007). Through four decades of research on resilience conducted among at-risk child and adult populations (e.g., Bonanno, Galea, Bucciarelli, & Vlahov, 2006; King, King, Foy, Keane, & Fairbank, 1999; Rutter, 1985; Werner, 1990), a number of dimensions of resilience have been identified (Masten, 2007). These include factors such as using adaptive coping strategies, the tendency to experience positive emotions, the maintenance of a positive or optimistic outlook on life, and the cultivation of meaningful social relationships (see for example Masten, 2007; Rutter, 1985). In recent years, resilience has been recognized as a key concept within the military context. Accordingly, scholars have examined resilience in this context (e.g., Meredith et al., 2011; Wald, Taylor, Asmundson, Jang, & Stapleton, 2006).

Master Resilience Training is an intervention based on cognitive-behavioral therapy (CBT) techniques intended to enhance Soldier R/PH across various dimensions of psychological fitness. The MRT training curriculum was adapted from the Penn Resiliency Program (PRP; Gillham, Jaycox, Reivich, Seligman, & Silver, 1990) and the Battlemind training program, a resilience-building intervention implemented in the Army prior to the development of CSF2 (Adler, Bliese, McGurk, Hoge, & Castro, 2009; Castro, Adler, McGurk, & Bliese, 2012). Both of these programs promote skills that are commonly developed by organizations. In this sense, neither program is teaching skills that could be considered entirely "experimental."

Both the PRP and MRT curricula center on the action-belief-consequence (ABC) model (Ellis, 1962). The model states that cognitions drive emotional and behavioral responses to life events (Ellis, 2003), and that depression and other problems are reflections of unrealistic, inaccurate, or maladaptive beliefs regarding life events or circumstances. Therefore, a focus of the PRP and other cognitive-behavioral interventions and treatments is to

teach participants to monitor their initial reactions to triggering events or circumstances in order to facilitate more adaptive emotional and behavioral responses. Toward this end, the PRP and MRT curricula emphasize strategies such as using optimistic explanatory styles, developing realistic beliefs about the causes and consequences of life events, the use of adaptive problem-solving, self-efficacy, self-regulation, emotional awareness, flexibility, and building strong interpersonal relationships (Reivich et al., 2011).

In several empirical trials and a recent meta-analysis of 19 controlled evaluations of the program (Brunwasser, Gillham, & Kim, 2009), the PRP has been found to lead to a slight reduction in depressive symptoms among various populations (e.g., Cardemil, Reivich, & Seligman, 2002; Gillham, Reivich, Jaycox, & Seligman, 1995; Yu & Seligman, 2002). The studies have demonstrated effects lasting through 12 months after initial follow-up (Brunwasser et al., 2009). The program has also been found to reduce behavioral problems and symptoms of anxiety (Gillham, Hamilton, Freres, Patton, & Gallop, 2006a; Gillham, et al., 2006b; Roberts, Kane, Thomson, Bishop, & Hart, 2003). While research on the effectiveness of the PRP shows generally positive effects, the PRP was not more effective than active comparison programs in reducing depression (Brunwasser et al., 2009), and the PRP may be less effective than other types of programs at reducing depressive disorders. Furthermore, there is currently no evidence that the program is effective among adults or in settings outside of schools (Brunwasser et al., 2009).

In addition to the studies examining the effectiveness of the PRP, a considerable body of literature has analyzed various cognitive-behavioral therapies upon which the PRP was based. Many of these empirical studies support the efficacy of cognitive-behavioral interventions and preventive strategies for a variety of behavioral and psychological disorders. For example, cognitive-behavioral strategies are frequently and successfully utilized in the treatment of depression and anxiety (DeRubeis, Gelfand, Tang, & Simons, 1999; Dobson, 1989; Hofmann & Smits, 2008; Wetherell, Gatz, & Craske, 2003), alcohol and substance abuse treatment and relapse prevention (Litt, Kadden, & Stephens, 2005; Morgenstern & McKay, 2007), criminal behavior and recidivism (Hall, 1995; Lipsey, Landenberger, & Wilson, 2007), and other diverse behavioral and psychological problems (Butler, Chapman, Forman, & Beck, 2006).

CBT programs have also been successfully adopted in organizational stress prevention programs (e.g., Flaxman & Bond, 2010; van der Klink, Blonk, Schene, & van Dijk, 2001). A comparative meta-analysis of various occupational stress interventions found that cognitive-behavioral interventions consistently produced the largest effect sizes on psychological outcomes associated with work-related stress (Richardson & Rothstein, 2008).

Various cognitive-behavioral interventions have been previously implemented and evaluated in military samples. The Navy BOOT STRAP and Army Battlemind programs are two examples of such programs implemented in the military. Navy BOOT STRAP aimed to reduce Naval basic training attrition rates by improving psychological functioning. BOOT STRAP was tested among recruits undergoing a stressful training period, who were identified as being at-risk for depression and

attrition from service. The intervention led to fewer depressive symptoms and increased problem-solving coping, while improving recruits' perceived quality of social relationships; the intervention also led to reduced separation from basic training (Williams et al., 2004, 2007).

Battlemind was used by CSF2 in developing its own curriculum. Battlemind consisted of a series of psychoeducational interventions targeting not only U.S. Army Soldiers, but also their families and Army leaders. The central component in each intervention focused on instilling and developing resilience-based skills. Most central to CSF2 resilience training is Battlemind post-deployment Soldier training (Adler et al., 2009), which focused on providing Soldiers with skills for transitioning from combat deployment into life back home. The efficacy of Battlemind post-deployment training was evaluated among Soldiers returning from deployment. The results demonstrated that, in comparison to a stress education control condition, Battlemind training was more effective at reducing mental health symptoms (Adler et al., 2009; Castro et al., 2012). Specifically, the intervention led to significantly fewer reported PTSD and depressive symptoms, and sleep problems, and reduced mental health stigma (Adler et al., 2009). Also, in comparison to a non-intervention control group, Soldiers who completed Battlemind post-deployment training reported higher psychological functioning, measured during a 6-month follow-up (Castro et al., 2012). Finally, there is evidence that an adapted version of Battlemind, used by the British Armed Forces, reduced problem drinking among Soldiers (Mulligan et al., 2012).

The literature reviewed here provides empirical support for the effectiveness of cognitive-behavioral strategies in promoting desirable outcomes in diverse areas related to social, behavioral, and emotional health in both civilian and military populations. However, we must also recognize that while the PRP and CBT interventions in general have been found to be effective, the research has been somewhat equivocal regarding the mechanisms that foster improvements in behavioral and mental health. For example, it is assumed that cognitive-behavioral interventions for substance abuse lead to the acquisition of coping skills (Morgenstern & Longabaugh, 2000; Morgenstern & McKay, 2007), but studies have often failed to pinpoint skill acquisition as a mediator of treatment, despite the fact that the treatments effectively reduced abuse and relapse rates (Litt, Kadden, Cooney, & Kabela, 2003; Litt et al., 2005; Morgenstern & McKay, 2007). The mediators of CBT-based interventions, most notably explanatory style, have been more clearly delineated in studies of depressive change, (DeRubeis et al., 1990; Yu & Seligman, 2002). Thus, while the aim of the present study was to determine whether increases in Soldier R/PH helped lower rates of adverse outcomes among Soldiers with MRTs in their units, it is acknowledged that in previous scholarship, mediation analyses have not yielded consistent, or even positive, results.

The literature on the PRP and other programs such as Battlemind suggests that a similar resilience training program would have the potential to yield benefits for Soldiers. Thus, while CSF2 resilience training program may have been implemented without comprehensive piloting (see Eidelson, Pilisuk, & Soldz, 2011), senior leadership deemed the effort important enough to the nation's Soldiers that it was willing to implement it

without taking some of the more conventional steps involved in the development of interventions (Casey, 2011). Initial analyses have provided evidence that resilience training may be producing the desired result of increasing Soldier resilience (Lester et al., 2011c). The next step in the evaluation process, therefore, is to examine whether such increases in R/PH have the potential to lead to improved mental and behavioral health outcomes.

Data and Methods

Design and Procedure

Resilience Training. As noted above, resilience training is the cornerstone of CSF2's resilience-enhancement strategy. The intervention is structured around a train-the-trainer approach in which MRTs receive classroom instruction in CSF2's resilience training curriculum. Specifically, NCOs selected by unit leadership to become MRTs attend a 10-day training course at one of a number of MRT training facilities, in which future MRTs become familiar with the program's resilience-enhancing curriculum and learn how to instruct other Soldiers in these lessons. MRTs then return to their units to pass along their knowledge to the Soldiers in their charge.

The MRT training course is structured around four instructional modules adapted from the PRP (Gillham et al., 1990; Reivich et al., 2011; Lester et al., 2011c) and Battlemind training. The first half of MRT training (Days 1-5) involves knowledge-based instruction guided by a series of instructional modules. Module One, *Resilience*, introduces MRT trainees to the concept of resilience, including key misinterpretations of what it means to be resilient (e.g., that resilience implies an absence of emotion). This module outlines the six MRT core competencies: self-awareness, self-regulation, optimism, mental agility, character strengths, and connection.

Module Two, *Building Mental Toughness*, provides detailed instruction on the core competencies through a series of lessons geared toward emphasizing different aspects of resilience. For example, lesson three teaches MRTs to *detect icebergs*, where students identify the deep-seated beliefs that drive their daily decisions and interactions. The lessons of this module are heavily influenced by techniques derived from CBT, notably, the ABC model developed by Ellis (1962). The strategies emphasize acknowledging patterns in thinking, checking those thinking patterns for accuracy, and substituting them with more productive ways of thinking. This module also incorporates elements from relaxation training and sports psychology, such as visualization, meditation, and deep breathing exercises.

Module Three*, Identifying Character Strengths*, is based on the work of Martin Seligman and colleagues (e.g., Park, Peterson, & Seligman, 2004) and centers on identifying signature strengths in oneself and others, such as wisdom, humor, courage, perseverance, and self-regulation. MRTs are taught how the identification of these strengths can be used to improve teamwork and tackle obstacles.

Module Four, *Strengthening Relationships*, teaches helpful communication strategies geared toward enhancing meaningful interpersonal relationships and increasing social support. Examples of lessons include active listening and responding, expressing interest, and giving encouragement or praise.

Master Resilience Trainers are taught to distinguish between various forms of communication (e.g., passive, assertive, aggressive) and to apply each style appropriately, depending on the context.

The next phase of the MRT training course (Days 6-8) focuses on teaching MRTs methods of delivering the resilience training so that MRTs will be proficient in providing resilience training to Soldiers in their unit. On Day 9 MRTs are presented with "Resilience First Aid" – that is, guidelines regarding the limits of MRTs in dealing with various potential resilience-related concerns of unit members – and deployment cycle resilience training (adapted from Battlemind). The focus of the final day (Day 10) is on performance psychology concepts, and MRTs are introduced to the importance of concepts such as goal setting, attention control, and energy management. Upon completion of the MRT training course, the certified MRTs return to their units to pass along the resilience training to Soldiers under their command.

While the MRT program has been implemented on a broad scale across the Army, this evaluation focuses on eight Brigade Combat Teams (BCTs) from October, 2010 to April, 2011. The Training condition consisted of four BCTs that received trained MRTs at the unit (company or equivalent) level during this time; the Non-training condition consisted of four BCTs that did not receive MRTs during this time, but instead constituted a wait-list control.

Measures

Resilience Training. A dichotomous variable indicating whether a Soldier was in the Training condition ("1") or Non-training condition ("0") was used as a predictor of R/PH and diagnoses in the mediation analyses.

Resilience/Psychological Health (R/PH). The GAT is an inventory consisting of a number of self-report assessments intended to measure the R/PH of Soldiers. While the GAT was designed to measure various aspects of emotional, family, social, and spiritual fitness (see Lester et al., 2011a, 2011b, 2011c) in this evaluation, we chose to examine six dimensions of R/PH for evaluation given their relevance to the MRT training curriculum (adaptability, catastrophizing, character, good coping [problem-focused coping], friendship and optimism). With the exception of catastrophizing, GAT scales were scored so that higher scores represent higher levels of R/PH; catastrophizing was negatively scored so that higher scores on that scale represent higher levels of catastrophic thinking. Table A1 in Appendix A presents more information on each of the scales used in this analysis.[2]

The GAT was completed by Soldiers at two different time points. The GAT was first completed by Soldiers in approximately

[2] Unlike in Technical Report #3 that used the Percentage of Maximum Possible (POMP) scores (Lester et al., 2011c), we retained the original scaling of the GAT subscales in this report for the following two reasons. First, this scaling option appears to be more common and more easily understood by the general audience than POMP scores. Second, in Technical Report #3, the analytical focus was on examining the mean differences between the Training and Non-training groups. Therefore, the POMP scores provided a convenient method of interpreting mean differences between groups as a percentage of maximum possible. In the current report, we rely on the use of regression framework rather than analysis of variance framework, so POMP scores would be less useful in this report than they were in Technical Report #3.

October, 2010 (Time 1). Time 1 is considered the official start of the MRT program, given that MRT training guidelines were published at approximately that time. About half of the Soldiers who completed the GAT at Time 1 completed the GAT again in approximately April, 2011; this completion of the GAT is referred to throughout this report as Time 2. Throughout the CSF2 evaluation process, Time 1 and Time 2 have served as the beginning and end points, respectively, for the program. For the purposes of the mediation analyses presented in this report, we focused on Soldiers' GAT scores at Time 2.

Deployment. Because deployment cycles—and the potential for combat experiences that deployments entail—are likely to impact the effectiveness of training programs of this type (Adler et al., 2009), it was necessary to examine the relationship between deployments and the implementation of the training. To do so, data from the Post-Deployment Health Assessment (PDHA; DD2796) questionnaire were used. These data were collected from January, 2008 through December, 2012. PDHA data allowed for the identification of individual Soldiers who had deployed since January, 2008, and allowed us to determine the precise dates that a deployment began and when it ended. In the analyses below, deployment was included as a binary variable at the level of the individual Soldier; a Soldier received a "1" if they returned from a deployment at some point following completion of the GAT at Time 2; Soldiers received a "0" if they had not deployed during this period of time.

Demographics. In each of the mediation analyses, we controlled for three demographic variables: gender (0 = Male; 1 = Female), age and rank (0 = Enlisted; 1 = NCO or Officer). Coding rank using two dummy variables (Enlisted vs. NCO and Enlisted vs. Officer) made the mediation analyses with substance abuse as an outcome impossible, given that no Officer received substance abuse diagnoses. Thus, to avoid technical problems with the analysis, rank was recoded into two categories – Enlisted vs. NCO and Officer.

Outcome Variables

Diagnoses for Mental Health and Substance Abuse Problems. To examine the relationship between resilience training and various diagnoses for mental and substance abuse problems, de-identified outpatient diagnosis data were obtained from the U.S. Army Medical Department's Patient Administration Systems and Biostatistics Activity (PASBA). Specifically, International Statistical Classification of Diseases and Related Health Problems (ICD-9) codes for anxiety, depression, PTSD, alcohol-related, and drug-related diagnoses were requested. These five categories were chosen given their potential to be impacted by increases in R/PH that might result from exposure to MRT training (and/or other CBT-based interventions).

To determine which specific codes to examine and how to collapse those codes, a number of sources were consulted. First, the work of Frayne and colleagues (2010) was used as guidance for the identification and classification of ICD-9 codes related to depressive disorders, anxiety, and problematic substance abuse issues. Additionally, the Medical Surveillance Monthly Report (MSMR), a monthly research report published by the Armed Forces Health Surveillance Center, was used (Armed Forces Health Surveillance Center, 2012a). Data from January, 2008 through December, 2012 were obtained from PASBA. The diagnoses, their

corresponding ICD-9 codes, and the broad categorizations are presented in Table A2 in Appendix A.

We made a number of decisions when computing diagnoses as outcome variables. First, because the sample included Soldiers who had been deployed, and because time is highly related to the development and identification of mental health issues among deployed Soldiers (e.g., Bliese, Wright, Adler, Thomas, & Hoge, 2007; Gray, Bolton, & Litz, 2004; Milliken, Auchterlonie, & Hoge, 2007; Thomas et al., 2010; Wolfe, Erickson, Sharkansky, King, & King, 1999), it was necessary to account for the timing of the deployments among Soldiers who returned from a deployment following completion of the training. To do this, we chose to standardize the time in which diagnoses would be computed for the analyses in this evaluation. Specifically, for the sample of Soldiers deployed to combat, we only considered a diagnosis if it occurred within the 120 days following the Soldier's return from deployment. This length of time was chosen roughly based on research that has shown PTSD (and related disorders) can be appropriately measured as early as 90-120 days post-deployment (Bliese, Wright, Adler, & Thomas, 2004). Thus, we ensured that all 5,581 Soldiers who had been deployed since January, 2008 had been back for 120 days before computing whether they had been diagnosed with a mental health or substance abuse problem. If a Soldier received a diagnosis, he or she received a score of "1" on the appropriate diagnosis; the Soldier received a score of "0" if no diagnosis was received for that particular diagnosis grouping at each time point.

For Soldiers who did not deploy at any time before or after training, 120 days since completion of the GAT at Time 2 was used in computing whether a Soldier was diagnosed with a mental health or substance abuse problem. Thus, if a non-deployed Soldier received a diagnosis within 120 days of completion of their second GAT, he or she received a score of "1" on the appropriate diagnosis and time point; the Soldier received a score of "0" if no diagnosis was received for that particular diagnosis at each time point. The descriptive statistics and correlations between all study variables are presented in Table C1 in Appendix C.

Analytic Strategy: Data Cleaning and Study Attrition

Data Cleaning. In total, 22,008 Soldiers participated in the present CSF2 evaluation. Among Soldiers in the resilience training program, 752 Soldiers gave invariant responses on the GAT, meaning that the Soldier chose the same response (e.g., "1") for all of the Positive Affect/Negative Affect (PANAS) subscale questions in the GAT. Because such responses have the potential to impact the mean scores on the various dimensions of fitness measured by the GAT, Soldiers who provided invariant responses were removed prior to analyses. Upon completion of the GAT, Soldiers were asked whether they would like to consent to have their responses used for research purposes; 3,318 Soldiers did not consent to having their data used for research purposes and were also removed prior to analyses. Additionally, for 126 Soldiers it was not possible to determine whether they were assigned to the Training or Non-training conditions; these Soldiers were removed prior to analyses. Data cleaning based on these three issues resulted in a sample consisting of 17,938 consenting Soldiers who took the GAT at Time 1. However, a substantial number of these

Soldiers did not complete the GAT at Time 2 and were eliminated from the sample using listwise deletion. This resulted in a sample of 8,564 Soldiers who completed the GAT at both Time 1 and Time 2. Among the 8,564 Soldiers who completed the GAT at both Time 1 and Time 2, 1,334 Soldiers had been deployed but returned from a deployment before MRT training began – and who, therefore, may have received a diagnosis long before resilience training began. These Soldiers were also eliminated from the sample. This left a final sample of 7,230 Soldiers to be included in the mediation analyses presented in the report.

Lost to Follow Up. Before proceeding with the mediation analyses, we examined whether there were systematic differences between Soldiers in the Training and Non-training conditions, who did and did not complete the GAT at Time 2. Thus, we examined whether the four groups (attrited-Training condition, attrited-Non-training condition, stayed-Training condition, and stayed-Non-training condition) differed in terms of gender, age, rank, and the GAT scales. First, we conducted a pair of chi-square tests with regard to the two dichotomous demographic variables (gender and rank). Soldiers significantly differed in gender, $\chi^2_{(3,\ n\ =\ 17{,}938)} = 9.54$, $p < .05$, and in rank, $\chi^2_{(3,\ n\ =\ 16{,}771)} = 36.40$, $p < .001$. Percentages by group for the chi-square analyses are presented in Table 1. Next, we conducted an analysis of variance (ANOVA) with regard to Soldier age. Age did not significantly differ between the four groups, $F_{(1,\ 17{,}934)} = 2.10$, $p > .05$. Finally, we conducted a 2 x 2 (attrition x Training condition) multivariate analysis of variance (MANOVA) to compare the groups on the six GAT scales used in the mediation analyses. This analysis revealed that there was no significant difference across these four groups on the GAT subscales (Wilk's $\lambda_{(6,\ 17{,}925)} = 1.23$, $p > .05$).

Table 1. Proportions of Group Gender and Rank

		n	Female	*n*	Officer/NCO
Attrited	Training	4,469	7.80%	3,828	44.60%
	Non-training	4,905	8.50%	4,424	42.90%
Stayed	Training	5,788	7.10%	5,757	48.20%
	Non-training	2,776	8.60%	2,762	48.10%

Note: Gender *n* = 17,938; Rank *n* = 16,771

Characteristics of the Final Sample

Initial Equivalence between Training and Non-Training Groups. Within the sample (*n* = 7,230) used for the mediation analysis, 4,983 Soldiers were in the Training condition and 2,247 Soldiers were in the Non-training condition. As the mediation analyses examined Time 2 scores on R/PH (adaptability, catastrophizing, character, good coping, friendship, and optimism), a MANOVA was conducted to assess whether Time 1 GAT scores of those in the Training and Non-training condition differed. The difference in the GAT scores across the conditions at Time 1 was statistically significant (Wilk's $\lambda_{(6,\ 7{,}223)} = 3.18$, $p < .01$; see Table 2), but the practical significance of the differences in scores was trivial (*eta squared* = .003). Thus, we concluded that Soldiers in the two conditions did not differ in their initial levels of R/PH.

Table 2. Time 1 GAT Scores for Soldiers Included in Final Sample

	Training *M* (*SD*)	Non-training *M* (*SD*)
Adaptability	3.85 (0.79)	3.80 (0.83)
Catastrophizing	2.17 (0.92)	2.20 (0.97)
Character	3.65 (0.94)	3.66 (0.97)
Good Coping	3.59 (0.82)	3.56 (0.83)
Friendship	4.17 (1.01)	4.13 (1.03)
Optimism	3.44 (0.81)	3.38 (0.80)

Note: Training *n*=4,983; Non-training *n*=2,247

Deployment. Soldier deployment may have an important effect on Soldier R/PH. Therefore, we examined PDHA data to determine whether Soldiers had returned from a deployment after completing the GAT at Time 2. First, among the 7,230 Soldiers in the mediation sample, we determined whether the Soldier was deployed sometime during or after the training.

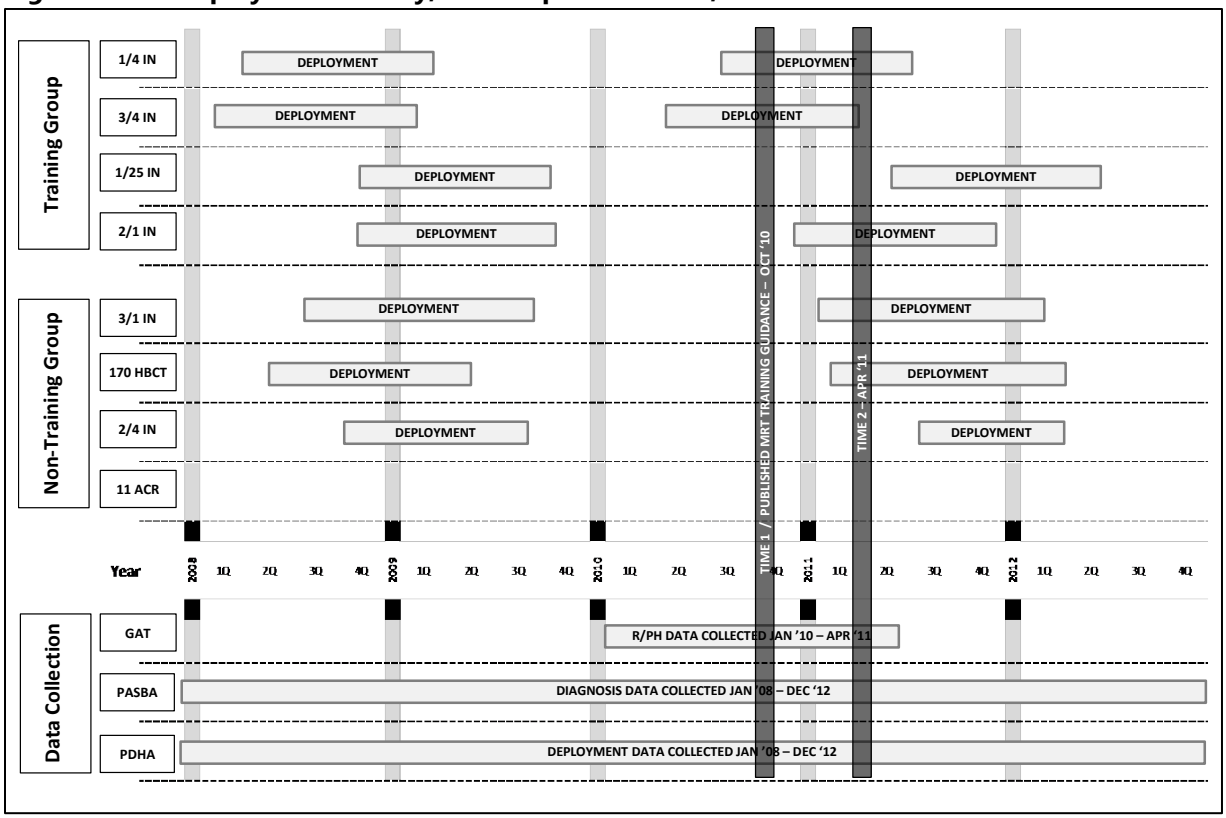
Approximately 77% of the Soldiers in the final sample had been deployed (*n* = 5,581; in the Training condition, *n* = 3,964; in the Non-training condition, *n* = 1,617), which means 23% (*n* = 1,649; in the MRT Training condition, *n* = 1,019; in the Non-training condition, *n* = 630) of the sample had not been deployed anytime since January, 2008, (the date from which we received deployment data). Figure 2 depicts the timing of deployments and the timing of the various data collection efforts.[3]

Demographics. Among Soldiers exposed to MRT training, 92.8% were male, the mean age at the completion of the GAT at Time 1 was 27.18 (*SD* = 6.27), and 3,964 (80%) returned from a deployment at some point after Time 2. Among Soldiers in the Non-training condition 91.1% were male, with a mean age of 27.57 (*SD* = 6.39) at Time 1; 1,617 (72%) returned from a deployment after Time 2.

Diagnoses for Mental Health and Substance Abuse Problems. As described above, data were obtained on five different mental and behavioral health diagnoses to be used as outcomes (anxiety, depression, PTSD, alcohol abuse, and drug abuse). Again, these data were collected within 120 days post-GAT 2 for the non-deployed group and 120 days post-deployment for the deployed group. Among the Soldiers in the Training condition 160 (3.2%) received diagnoses for anxiety, 47 (0.9%) for depression, 74 (1.5%) for PTSD, 58 (1.2%) for alcohol abuse, and 4 (0.1%) for drug abuse. Among the Soldiers in the Non-training condition 63 (2.8%) received diagnoses for anxiety, 32 (1.4%) for depression, 37 (1.6%) for PTSD, 61 (2.7%) for alcohol abuse, and 10 (0.4%) for drug abuse.

[3] While exposure to combat and the number of deployments are undoubtedly important considerations for an evaluation such as this, it was difficult to include such controls into the mediation models given that it was impossible for Soldiers in the non-deployed sample to contribute information on either of these variables.[3] Nonetheless, we felt it was important to at least explore the characteristics of deployed Soldiers on these two variables. To measure combat exposure we used data from the PDHA, on which Soldiers indicated whether they had experienced combat-related exposure during their deployment. Combat exposure was defined as whether a soldier: (1) encountered or saw fellow coalition Soldiers, enemies, or civilians killed or wounded; (2) engaged in direct combat where they discharged a weapon either on land, sea, or air; or (3) felt that at some point during deployment they were in great danger of being killed. If a Soldier indicated experiencing any one of these events, he or she was counted as having experienced combat. Among those in the Non-training condition, 596 (37.1%) Soldiers indicated a combat experience in their most recent deployment; 1,426 Soldiers (36.0%) in the Training condition indicated a combat experience.

Figure 2.Unit Deployment History, MRT Implementation, and Data Collection Timeline



The frequency of diagnoses, in both conditions, was fairly low. Thus, we aggregated the five diagnoses into two outcomes: (a) diagnoses for mental health problems, (diagnoses for anxiety, depression, or PTSD), and (b) diagnoses for substance abuse problems (alcohol or drug abuse diagnoses). A similar approach to grouping psychological health problems has been taken in previous research (Wilk et al., 2010).

Analytic Strategy: Mediation Analyses

The indirect effect of resilience training on diagnoses for mental health and substance abuse problems via increasing Soldier R/PH was examined using multilevel modeling. This approach was used because of the hierarchical structure of the data obtained from Soldiers nested within their respective Army units (Kozlowski & Klein, 2000). Thus, both levels — the Soldier level and the unit level — were taken into consideration in the analyses. Given that Army units, rather than individual Soldiers, were assigned to the Training and Non-training conditions, the presence or absence of resilience training was considered a Level 2 (i.e., unit-level) variable. Because R/PH scores, control variables, and outcome variable scores were obtained from individual Soldiers, these variables were considered Level 1 (i.e., Soldier-level) variables.

Because the outcome variables of interest were dichotomous, hierarchical generalized linear modeling for outcome variables following a Bernoulli distribution (HGLM; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011) was used to test for the mediating effects of Soldier R/PH in the relationship between the resilience training and the outcomes. Each HGLM model included: a dichotomous variable indicating whether the Soldier was in a unit with a resilience trainer

(Level 2 predictor), individual Soldiers' R/PH scores at Time 2 (Level 1 mediator), and a dichotomous outcome variable (Level 1 dependent variable). A set of Level 1 control variables (age, rank, gender, and deployment status) was also included.

The test of multilevel mediation was conducted in three steps (Mathieu & Taylor, 2007):

1. Testing the effect of the Level 2 predictor (i.e., Training) on the Level 1 outcome (i.e., diagnoses for mental health problems and diagnoses for a substance abuse problem). We would like to note that in our mediation analysis, we followed the recommendations of methodologists who suggested the first requirement of Baron and Kenny's (1986) causal steps approach to testing mediation (i.e., X → Y) is relaxed for reasons such as: (1) sample size is too small to detect the effect in the sample when this effect exists in the population (LeBreton, Wu, & Bing, 2009), especially if this effect is small in magnitude (Shrout & Bolger, 2002), and (2) the mediation model depicts a temporally distal causal process (Shrout & Bolger, 2002). Both reasons are relevant for the current analysis.

2. Testing the effect of the Level 2 predictor (i.e., Training) on the Level 1 mediator (i.e., Soldier R/PH).

3. Testing the effects of the Level 2 predictor (i.e., Training) and the Level 1 mediators (i.e., Soldier R/PH) on the outcome variable (i.e., diagnoses for mental health problems and diagnoses for substance abuse problems). It should be noted that in order to avoid the conflation of between- and within-group effects that could occur in multilevel mediation models with Level 2 predictors, Level 1 mediators and Level 1 outcomes, the multilevel mediation models tested at Step 3 included one additional predictor — the group means of the mediator variables at Level 2 — as recommended by Zhang, Zyphur, and Preacher (2009).

The estimates of the indirect effects (i.e., the effects of training on the outcomes via R/PH) were then computed as the products of two gamma-coefficients: (1) a coefficient linking a Level 2 predictor to a Level 1 mediator obtained at Step 1 of the mediation analysis, and (2) a coefficient linking a Level 2 group mean of the mediator variable to a Level 1 outcome variable obtained at Step 3 of the mediation analysis (Zhang et al., 2009).

Further, the indirect effects of the training on the outcomes via R/PH were tested using the asymmetric confidence limits approach (MacKinnon, Lockwood, & Williams, 2004; MacKinnon, Fritz, Williams, & Lockwood, 2007) that was shown to perform better than alternative tests for indirect effects in terms of its statistical power and ability to produce accurate Type I error rates (Pituch, Whittaker, & Stapleton, 2005).

It is important to point out that the test of multilevel mediation was performed using one mediator at a time in order to avoid problems that could result if multiple intercorrelated predictors (i.e., six GAT subscales in addition to multiple control variables) were simultaneously included in the same multilevel model. Such problems include an inability to allow for the effects of all Level 1 variables to vary randomly across Level 2 units, suppression, multicollinearity, and problems with model convergence. In addition, testing for the effects of one

mediator at a time: (1) allowed us to determine which aspects of Soldier R/PH were affected by the training and were also most effective with respect to improving the outcomes of interest, and (2) was in line with the analytic strategy adopted in the previously published technical reports (Lester et al., 2011a, 2011b, 2011c).

Finally, it should be noted that in order to conduct a proper test of mediation, each variable has to be measured at three separate time points in their expected causal sequence (LeBreton et al., 2009; Mathieu & Taylor, 2007). Thus, the predictor, mediators, and outcome data used in the mediation analyses below were collected at three distinct time points.

Prior to testing a set of multilevel models, intraclass correlation coefficients (ICC(1)s; Bliese, 2000) were computed in order to determine the degree of non-independence in both Level 1 mediator and Level 1 outcome variables (Mathieu & Taylor, 2007) that was due to Soldier membership within Army units. This analysis examined the extent to which Soldiers' GAT scores and outcome variables varied as a function of unit membership and therefore allowed us to determine whether the use of multilevel modeling as opposed to its single-level alternative was justified. ICC(1)s for continuous mediators were computed as proportions of variance in each mediator that resided between groups (Raudenbush & Bryk, 2002). ICC(1)s for dichotomous outcomes were computed using the analysis of variance approach (Ridout, Demetrio, & Firth, 1999). The ICC(1)s obtained for mediators and outcome variables used in the current analyses are reported in Table B1 in Appendix B. As shown in this table, the ICC(1)s ranged from .01 to .04, suggesting that there is some non-independence among Soldiers' scores on mediator and outcome variables within units. Thus, to account for that non-independence among Soldiers nested within their corresponding Army units, the data were analyzed using multilevel modeling. The HGLM analysis was performed using HLM7 (Raudenbush, Bryk, & Condon, 2011).

Results

Frequencies

The frequencies of outcomes, as aggregated into broad categories of diagnoses for both the Training and Non-training conditions, are depicted in Table 3. As the table shows, the Soldiers in the Training condition had lower rates of diagnoses for both mental health problems and substance abuse problems. The findings provide preliminary evidence that training may impact the mental and behavioral health of Soldiers.

Mediation Analyses

As noted earlier, to examine the effects of resilience training on diagnoses via Soldier

Table 3. Frequency of Diagnoses Among Training and Non-training Conditions

	Diagnoses for Mental Health Problems	Diagnoses for Substance Abuse Problems
Training (n = 4,983)	221 (4.44%)	58 (1.16%)
Non-training (n = 2,247)	114 (5.07%)	64 (2.85%)
Total (n = 7,230)	335 (4.63%)	122 (1.69%)

Note: Due to comorbidity, these numbers do not necessarily reflect the sums of the percentages of diagnoses presented in the preceding paragraphs.

R/PH, a set of multilevel mediation models was tested. At Step 1 of the mediation analysis, the effects of resilience training (Level 2 predictor) on the outcome were examined. At Step 2, the effects of resilience training (Level 2 predictor) on aspects of Soldier R/PH (Level 1 mediator) were examined. At Step 3, the effects of the R/PH (Level 1 mediator) and the group means of R/PH variable (Level 2 mediator) on diagnoses for mental health problems and diagnoses for substance abuse problems (Level 1 outcomes) were examined in the presence of resilience training (Level 2 predictor). At all steps, Soldier age, gender, rank and deployment status were used as control variables. The full results of all mediation analyses are presented in Appendix C.

*Training, R/PH, and Diagnoses for Mental Health Problems***.** The analysis revealed that training had no significant direct effect on diagnoses for mental health problems (Table C2, Step 1). Further, the analysis showed that training improved five positive aspects of Soldier R/PH – optimism, adaptability, coping, friendship, and character; the effect of training on the negative aspect of R/PH – catastrophizing – was negative, as expected, but only marginally significant ($p < .07$) (Table C2, Step 2). It should be noted that this step, which demonstrates that relationships between training (Level 2 predictor) and five aspects of Soldier R/PH (Level 1 mediators) are significant, remains the same for the current analysis with mental health diagnoses as an outcome and the analysis with substance abuse diagnoses as an outcome described below. Therefore, we will omit the discussion of this step from the discussion of effects of training on substance abuse diagnoses below.

Further, the results of this analysis indicated that at Level 2, three group mean R/PH variables were related to diagnoses for mental health problems: optimism and adaptability were negatively related to these diagnoses, and catastrophizing was positively related to these diagnoses. Therefore, two aspects of Soldier R/PH (optimism and adaptability) emerged as potential mediators given that they were affected by resilience training and exerted significant effects on mental health diagnoses.

The mediating effects of these two Level 2 R/PH variables were tested using the asymmetric confidence limits approach (MacKinnon et al., 2004; MacKinnon et al., 2007). This analysis indicated that both optimism and adaptability mediated the effects of MRT training on diagnoses for mental health problems. The indirect effects of resilience training on mental health diagnoses were significant in models with optimism as a mediator (the indirect effect was -0.05, 95% CI [-0.12; -0.01]) and adaptability as a mediator (the indirect effect was -0.06, 95% CI [-0.13; -0.01]).

Overall, the mediation analysis revealed that resilience training did contribute to the reduction of mental health diagnosis rates via improving some aspects of Soldier R/PH, as expected. Further, in all of the mediation models, the direct effects of resilience training on diagnoses for mental health problems were not significant, suggesting that optimism and adaptability fully mediated the effects of training on these diagnoses. These findings provide evidence that diagnoses for mental health problems can be reduced by improving just one of the two aspects of R/PH that emerged as significant mediators.

Training, R/PH, and Diagnoses for Substance Abuse. The analysis revealed that training had a direct, negative effect on diagnoses for substance abuse problems (Table C3; Step 1); that is, the training appeared to reduce the likelihood of being diagnosed with a substance abuse problem. Further, only one Level 2 R/PH variable (coping) was a positive predictor of a diagnosis for a substance abuse problem (Table C3; Step 3). Thus, coping emerged as a potential mediator of the effect of training given that it was affected by resilience training and exerted a significant effect on substance abuse diagnoses. The test of the indirect effects using asymmetric confidence limits approach (MacKinnon et al., 2004; MacKinnon et al., 2007) revealed that the indirect effect training on substance abuse diagnoses via coping was positive and significant (the indirect effect was 0.06, 95% CI [0.002; 0.14]). It should be noted that while the direct effect of training on alcohol/drug abuse remained negative, its indirect effect via coping was positive. This effect is not readily interpretable (especially given that coping has a negative effect on substance abuse diagnoses at Level 1) and is likely to be artifactual (given that the direct effect of training on substance abuse diagnoses in Model 1 is smaller than the effect of training on substance abuse diagnoses in the presence of the mediator variables in Model 3; cf. MacKinnon, Krull, & Lockwood, 2000). Therefore, we focus on interpreting the direct effect of training on diagnoses for substance abuse problems rather on its indirect effect via coping.

Summary

Two primary conclusions can be drawn based on the mediation analyses reported above:

1. The results indicate that resilience training had an indirect negative effect on mental health diagnoses via improving optimism and adaptability.

2. The analyses reveal that resilience training has a direct negative effect on being diagnosed with a substance abuse problem.

Finally, we would like to note that the analyses were performed using one mediator and one outcome at a time for reasons discussed in the analytic strategy section of this report. Thus, it is important to acknowledge the potential of Type I error inflation and its effects of the current findings. However, it is unlikely that the results of the mediation analyses with mental health diagnoses as an outcome are spurious and due to Type I error given that the proportion of the mediators that found to be significant (i.e., 2 out of 6, or .33) exceeded what would be expected by chance (i.e., 1 out of 20, or .05, given $\alpha = .05$).

Discussion

The results of this evaluation provide evidence that various indicators of R/PH are improved by resilience training and, in turn, are negatively related to the likelihood of receiving a mental health or substance abuse diagnosis. Two primary conclusions can be drawn from this evaluation.

First, the analyses showed that the relationship between resilience training and diagnoses for mental health problems were mediated by adaptability and optimism. Consequently, this evaluation provides evidence that the improvements in R/PH associated with resilience training may yield

practically beneficial outcomes for those Soldiers exposed to the training.

Second, the results of the analyses provided evidence that resilience training is likely to reduce the odds of receiving substance (i.e., drug and alcohol) abuse diagnoses. This finding provides evidence that resilience training may be providing Soldiers with skills to more effectively respond to stress, which may, in turn, reduce the need to depend upon drugs or alcohol to deal with stress.

Implications

The results of this evaluation are fairly consistent with the expectations of the designers of the PRP and MRT programs, who developed resilience training with an eye toward indirectly reducing anxiety, depression, and PTSD symptoms among Soldiers (Reivich et al., 2011). In addition, the mediating relationships found in this evaluation appear to be somewhat similar to those in previous evaluations of the PRP, which demonstrated that the relationship between resilience training and depressive symptoms was mediated by improved explanatory styles (Gilham et al., 1995; Yu & Seligman, 2002).

But what does this mean for CSF2, the Army, and policy makers in general? While some evidence of effectiveness of resilience training has been found, it must be acknowledged that the indirect effects of resilience training upon the outcomes examined in this evaluation were quite small, suggesting the training may present a small benefit for Soldiers. At the same time, however, the indirect effects of the training need to be considered in the context that currently exists within the Army and the broader Armed Forces, where mental health disorders have been increasingly identified as a major challenge (Department of the Army, 2012). The April 2012 Medical Surveillance Monthly Report (MSMR) from the Armed Forces Health Surveillance Center (AFHSC) indicated that mental disorders were the second leading reason for hospitalization in 2007 and 2009, and the number one reason for hospitalizations in 2011 (Armed Forces Health Surveillance Center, 2012b). These effects are being felt disproportionately in the Army, where the crude rate of hospitalizations was approximately 70 percent higher than in the Marine Corps and more than twice as high as in the other services (Armed Forces Health Surveillance Center, 2012b). In light of such high rates of mental health disorders, the Army has recognized that preventive measures such as CSF2 may be critical in maintaining the health of the force. It appears that CSF2 and resilience training have the potential to reduce the number of health problems by helping to improve and bolster the psychological health of Soldiers. Given that mental health issues are so prevalent in today's Army, even small reductions in the number of mental health diagnoses of Soldiers can have a great impact upon the overall health of the force, and may lead to significant multi-level cost savings for the Army over time.

Additionally, this evaluation is consistent with the findings of similar interventions designed to impact the R/PH of service members. Evaluations of those programs found that problem drinking among Soldiers could be reduced (Mulligan et al., 2012), and that among individuals at-risk for depression and attrition from service, interventions could result in fewer depressive symptoms and lower rates of attrition from basic training (Williams et al., 2004, 2007). As such, the

findings of this evaluation contribute to the overall message that interventions designed to help members of the Armed Forces can help lead to improved outcomes for both the individual and the organization.

Limitations and Considerations

As with any research endeavor, there are limitations that must be taken into account when evaluating the results of this study. We present a number of limitations to this particular study below.

Deployment Cycles and Diagnoses. The deployment cycles of the eight BCTs under consideration in this report may have impacted the results of the evaluation. Soldiers in the Training condition were somewhat more likely to be deployed during or after the training, resulting in an imbalance in the number of deployed Soldiers in each condition. This is critical given that we know combat exposure has a strong negative impact upon mental health (Adler, Huffman, Bliese, & Castro, 2005; Reger, Gahm, Swanson, & Duma, 2009). While every effort was taken to account for these potential confounds, it is possible the imbalanced nature of the deployment cycles between the Training and Non-training conditions may have impacted the effects of the training. In sum, the effects of deployment on Soldier R/PH, psychological problems and substance abuse cannot be fully disentangled from the effects of training.

In addition, because the computation of a diagnosis was capped at 120 days following a deployment, among Soldiers who were deployed, we did not consider diagnoses that occurred after that 120 day window. Because mental health diagnoses are strongly related to the amount of time since a Soldier returned from a deployment (Bliese et al., 2007; Milliken et al., 2007; Wolfe et al., 1999), this decision may have led to an underestimation of the number of diagnoses among deployed Soldiers in these analyses. Nonetheless, the approach taken in this report may actually represent a more conservative test of the effects of the training since the 120 day restriction was placed on mental health diagnoses for all Soldiers, thus limiting the number of diagnoses that we were likely to observe for each Soldier.

Limitations of Global Assessment Tool. Another potential limitation of the present study is the use of the GAT. Some predictive evidence for the GAT has been presented in previous studies, and many of the GAT scales were adapted from existing scales into abbreviated forms. However, these adapted scales were not subjected to rigorous scientific validation prior to being implemented, and there is evidence demonstrating that shorter scales will almost always result in lower validity estimates (Credé, Harms, Nierhorster, & Gaye-Valentine, 2012). Furthermore, the constructs measured by the GAT are considerably intercorrelated. This limited our ability to include multiple mediators in the same model and avoid testing multiple mediated models with one mediator at a time (see the Analytic Strategy section for more details). Because of this, our analyses targeted a sample of GAT scales, and thus our ability to estimate the overall impact of various aspects of R/PH was diminished.

In general, the weaknesses of the GAT are likely to result in an underestimation of the effects found for resilience training and the resulting impact on relevant outcomes. These measurement issues are being addressed now via the creation of GAT 3.0, which is slated for release in 2014 or 2015. For

example, selecting aspects of psychological R/PH that are less redundant would reduce the multicollinearity problems. Using a forced-choice, item-response style set of items with differing levels of item-difficulty or endorsement rates would substantially improve the capacity of the measure to detect changes. And simply creating a more balanced scale would result in more confidence in the ability to compare differences across domains. These changes should be made as this project moves forward. Further analysis using the improved instruments will be more accurate and may show larger effects.

Use of Diagnosis Data. While diagnosis data represent outcomes of interest to the individual Soldier and to the Army, we would like to briefly recognize the implications of using diagnosis data as outcome variables for this evaluation. First, because of the nature of the diagnoses under consideration (anxiety/depression/PTSD and substance abuse) we acknowledge that the Soldiers diagnosed with such problems were not simply a random subset of Soldiers who happened to receive a diagnosis for that problem. Instead, it is quite possible that a number of Soldiers were referred to seek care for mental health or substance abuse problems that became apparent to others inside the organization. Furthermore, because there may be a lag between the development of the mental health problem and the diagnosis (because of waiting lists, concerns by Soldiers about the impact of such diagnoses on their career, stigma, etc.), diagnosis data from the Army may not be fully capturing the number of Soldiers who have developed serious mental health issues. In short, the Soldiers who have received a diagnosis may only represent a subset of the overall number of Soldiers who actually have disorders. In addition, the way in which diagnosis data were included in these analyses (120 days post-deployment for the deployed sample and 120 days post-GAT 2 for the non-deployed sample) may have impacted the count of diagnoses among this sample. Additional research that extends that 120-day period to a longer time frame may help determine whether resilience training has a more long-term relationship with the diagnoses examined in this report. Further, such an analysis may shed light on whether the effects of the training persist over time.

Effect Sizes. As the results of the mediation analyses demonstrate, the indirect impact of resilience training – in the few number of cases in which indirect effects do exist – appears to be small in size. However, as discussed by Lester et al. (2011c), the effect sizes observed in the present report were not unlike those of other prevention programs. Population-wide prevention programs, which are designed for preventing harm rather than treating it, tend to have substantially lower effect sizes when compared to targeted treatment programs (Babcock, Green, & Robie, 2004). Similar to other universal programs, this preventive program did not specifically target individuals at risk for mental health or substance abuse problems (Sorensen, Emmons, Hunt, & Johnston, 1998). As a consequence, Soldiers at all levels of risk for mental and behavioral health problems received resilience training. This universal selection stands in stark contrast to targeted interventions with a more homogeneous sample of at-risk participants where greater effects are likely to be found. Thus, the small effect sizes found in this evaluation are similar to effects found in other universally applied interventions (Meyer et al., 2001).

From a practical perspective, it is important to consider that resilience skill effects may be cumulative such that small differences may result in large positive gains over time. For instance, Soldiers who practice skills such as adaptive problem solving, self-regulation, and emotional awareness will presumably have more positive interpersonal interactions with others. On a short-term basis (any single interaction episode) it may be hard to detect differences between those with and without the skill training. In the long-run, however, those trained in resilience skills may experience a significantly higher percentage of positive interactions which may benefit both the individual and the organization.

Cumulative effects from small effect sizes are not easily modeled in typical statistical analyses (Abelson, 1985); nonetheless, cumulative effects clearly exist in domains such as exercise, financial asset building, and baseball batting averages. In each of these, the short-term behavior (walking flights of stairs instead of using elevators; saving $50 a month in a mutual fund; striking out or getting a hit at any particular at bat) represent a small effect size, but over time produce significant and meaningful differences. In the case of cumulative effects, Abelson (1985) makes the argument that establishing significance is more important than estimating effect sizes. We offer that it is worth considering whether resilience training represents a form of cumulative processes (see also Bliese et al., 2011).[4]

Quality of MRT Training. As noted in the previous evaluation of CSF2 (Lester et al., 2011c) a survey of MRT trainers found that the training was not administered consistently across individuals and units. Consequently, Soldiers within the Training group itself likely received differential levels of training. Because the analyses reported in Lester et al. (2011c), provided evidence that the effectiveness of resilience training was contingent upon whether the MRT trainer led formal training sessions, whether the MRT trainer felt prepared, and whether the MRT trainer received the support of command, it is possible that this fact also led to an underestimation of the effectiveness of the MRT program since not all units received the intended level or quality of training. However, while it is recognized that the effectiveness of the training model is somewhat contingent upon the quality and frequency of that training, an analysis of such variables was not conducted in this report. Future research should be undertaken that examines these variables in addition to other interpersonal factors that might impact the effectiveness of the training.

[4] We thank COL Paul Bliese for his contribution to the discussion of effects sizes obtained in this report.

Conclusion

An expressed objective of the CSF2 program is to help shift Army culture, not only to one that values mental health as equally as it values physical health, but from a focus on treating illness after it occurs to preventing it from ever occurring in the first place (Casey, 2011). The outcomes examined in this report provided a stringent test of how effectively resilience training is meeting this second objective.

The results of this evaluation provide evidence that the program assists in improving the R/PH of Soldiers, which appears to, in turn, help reduce the odds of developing diagnosable mental health issues

among Soldiers. Consequently, the findings suggest that the resilience training component of CSF2 has the capability to improve health and behavioral outcomes for individual Soldiers, which may improve the overall effectiveness and efficiency of the Army as a whole. It would be beneficial for future evaluations and assessments to examine the extent to which such improvements might lead to the improved functioning of both individual Soldiers and the Army.

In light of the limitations discussed above, we note that this evaluation has built on the results of previous evaluations to provide further evidence that resilience training was effective at increasing Soldier R/PH, and that such increases were associated with reduced odds of being diagnosed with a mental health or substance abuse problem. Consequently, the results of this evaluation should contribute to CSF2's confidence that resilience training is having the intended effects. In the end, we recommend that the Army continue to critically evaluate the program components, and the program as a whole.

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Appendix A

Table A1. GAT Dimensions and Subscales

Dimension/ Subscale	# of Items	Scale Range	Example Question	Author(s)
Adaptability	3	1 = Not like me at all 5 = Very much like me	I can usually fit myself into any situation.	Developed by Professors C. Peterson and N. Park.
Good Coping	4	1 = Not like me at all 5 = Very much like me	When something stresses me out, I try to solve the problem.	Adapted by Professors C. Peterson and N. Park from previous research, e.g., Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56*, 267-283.
Catastrophizing	7	1 = Not like me at all 5 = Very much like me	When bad things happen to me, I expect more bad things to happen.	Adapted by Professors C. Peterson and N. Park from previous research, e.g., Peterson, C., Bishop, M. P., Fletcher, C. W., Kaplan, M. R., Yesko, E. S., Moon,... & Michaels, A. J. (2001). Explanatory style as a risk factor for traumatic mishaps. *Cognitive Therapy and Research*, 25, 633-649.
Character	24	0 = Never 5 = Always	Bravery or courage	Peterson, C. (2007). *Brief Strengths Test*. Cincinnati, OH: VIA Institute. Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. New York: Oxford University Press/Washington, DC: American Psychological Association.
Optimism	4	1 = Strongly disagree 5 = Strongly agree	Overall, I expect more good things to happen to me than bad.	Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67*, 1063-1078.
Friendship	6	0 = No 1 = Yes	I have someone to talk to when I feel down.	Developed by Professors C. Peterson and N. Park.

Table A2. Diagnoses and Corresponding ICD-9 Codes	
Alcohol Abuse-Related Diagnoses	
291.00	Alcohol withdrawal delirium
291.30	Alcohol-induced psychotic disorder with hallucinations
291.50	Alcohol-induced psychotic disorder with delusions
291.81	Alcohol withdrawal
291.89	Other alcohol-induced mental disorders
291.90	Unspecified alcohol-induced mental disorders
305.00	Alcohol abuse, unspecified
305.01	Alcohol abuse, continuous
305.02	Alcohol abuse, episodic
305.03	Alcohol abuse, in remission
303.00	Acute alcoholic intoxication in alcoholism, unspecified
303.01	Acute alcoholic intoxication in alcoholism, continuous
303.02	Acute alcoholic intoxication in alcoholism, episodic
303.03	Acute alcoholic intoxication in alcoholism, in remission
303.90	Other and unspecified alcohol dependence, unspecified
303.91	Other and unspecified alcohol dependence, continuous
303.92	Other and unspecified alcohol dependence, episodic
303.93	Other and unspecified alcohol dependence, in remission
Drug Abuse-Related Diagnoses	
292.00	Drug withdrawal
292.11	Drug-induced psychotic disorder with delusions
292.12	Drug-induced psychotic disorder with hallucinations
292.81	Drug-induced delirium
292.82	Drug-induced persisting dementia
292.83	Drug-induced persisting amnestic disorder
292.84	Drug-induced mood disorder
292.85	Drug induced sleep disorders
292.89	Other specified drug-induced mental disorders
292.90	Unspecified drug-induced mental disorder
304.00	Opioid type dependence, unspecified
304.10	Sedative, hypnotic or anxiolytic dependence, unspecified
304.20	Cocaine dependence, unspecified
304.30	Cannabis dependence, unspecified
304.40	Amphetamine and other psychostimulant dependence, unspecified
304.50	Hallucinogen dependence, unspecified
304.60	Other specified drug dependence, unspecified
304.70	Combinations of opioid type drug with any other drug dependence, unspecified
304.80	Combinations of drug dependence excluding opioid type drug, unspecified

(Table continues)

304.90	Unspecified drug dependence, unspecified
305.20	Cannabis abuse, unspecified
305.21	Cannabis abuse, continuous
305.22	Cannabis abuse, episodic
305.23	Cannabis abuse, in remission
305.30	Hallucinogen abuse, unspecified
305.31	Hallucinogen abuse, continuous
305.32	Hallucinogen abuse, episodic
305.33	Hallucinogen abuse, in remission
305.40	Sedative, hypnotic or anxiolytic abuse, unspecified
305.41	Sedative, hypnotic or anxiolytic abuse, continuous
305.42	Sedative, hypnotic or anxiolytic abuse, episodic
305.43	Sedative, hypnotic or anxiolytic abuse, in remission
305.50	Opioid abuse, unspecified
305.51	Opioid abuse, continuous
305.52	Opioid abuse, episodic
305.53	Opioid abuse, in remission
305.60	Cocaine abuse, unspecified
305.61	Cocaine abuse, continuous
305.62	Cocaine abuse, episodic
305.63	Cocaine abuse, in remission
305.70	Amphetamine or related acting sympathomimetic abuse, unspecified
305.71	Amphetamine or related acting sympathomimetic abuse, continuous
305.72	Amphetamine or related acting sympathomimetic abuse, episodic
305.73	Amphetamine or related acting sympathomimetic abuse, in remission
305.80	Antidepressant type abuse, unspecified
305.81	Antidepressant type abuse, continuous
305.82	Antidepressant type abuse, episodic
305.83	Antidepressant type abuse, in remission
305.90	Other, mixed, or unspecified drug abuse, unspecified
305.91	Other, mixed, or unspecified drug abuse, continuous
305.92	Other, mixed, or unspecified drug abuse, episodic
305.93	Other, mixed, or unspecified drug abuse, in remission
Anxiety Related Diagnoses	
300.00	Anxiety state, unspecified
300.02	Generalized anxiety disorder
Depression Related Diagnoses	
296.20	Major depressive affective disorder, single episode, unspecified
296.21	Major depressive affective disorder, single episode, mild
296.22	Major depressive affective disorder, single episode, moderate

(Table continues)

296.23	Major depressive affective disorder, single episode, severe, without mention of psychotic behavior
296.24	Major depressive affective disorder, single episode, severe, specified as with psychotic behavior
296.25	Major depressive affective disorder, single episode, in partial or unspecified remission
296.26	Major depressive affective disorder, single episode, in full remission
296.30	Major depressive affective disorder, recurrent episode, unspecified
296.31	Major depressive affective disorder, recurrent episode, mild
296.32	Major depressive affective disorder, recurrent episode, moderate
296.33	Major depressive affective disorder, recurrent episode, severe, without mention of psychotic behavior
296.34	Major depressive affective disorder, recurrent episode, severe, specified as with psychotic behavior
296.35	Major depressive affective disorder, recurrent episode, in partial or unspecified remission
296.36	Major depressive affective disorder, recurrent episode, in full remission
296.82	Atypical depressive disorder
301.12	Chronic depressive personality disorder
309.10	Prolonged depressive reaction
311.00	Depressive disorder, not elsewhere classified
301.13	Cyclothymic disorder
300.40	Dysthymic disorder
Post-Traumatic Stress Disorder	
309.81	Post-traumatic stress disorder

Appendix B

Table B1. Intraclass Correlation Coefficients for the Mediator and Outcome Variables Used in the Mediation Analyses	
Variable	
GAT subscale	**ICC(1)**
Adaptability	0.01
Catastrophizing	0.01
Character	0.02
Good Coping	0.01
Optimism	0.01
Friendship	0.02
Outcome	
DX for Psychological Health	0.04
DX for Alcohol/Drug Abuse	0.01
Notes: n = 7,230 DX = Diagnosis	

Appendix C

Table C1. Means, Standard Deviations, and Correlations between Study Variables

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Adaptability$_1$	3.84	0.81	.69																		
2. Catastrophizing$_1$	2.18	0.93	-.42***	.77																	
3. Character$_1$	3.65	0.95	.58***	-.33***	.98																
4. Good Coping$_1$	3.58	0.83	.61***	-.32***	.67***	.85															
5. Optimism$_1$	3.42	0.81	.48***	-.60***	.49***	.52***	.75														
6. Friendship$_1$	4.16	1.02	.30***	-.25***	.38***	.32***	.36***	.64													
7. Adaptability$_2$	3.84	0.81	.50***	-.32***	.39***	.40***	.38***	.23***	.68												
8. Catastrophizing$_2$	2.15	0.95	-.28***	.42***	-.25***	-.26***	-.41***	-.21***	-.46***	.80											
9. Character$_2$	3.63	1.01	.40***	-.26***	.53***	.41***	.38***	.28***	.62***	-.36***	.98										
10. Good Coping$_2$	3.6	0.85	.41***	-.27***	.43***	.51***	.41***	.25***	.64***	-.35***	.68***	.87									
11. Optimism$_2$	3.44	0.79	.36***	-.42***	.38***	.38***	.58***	.29***	.52***	-.60***	.52***	.56***	.75								
12. Friendship$_2$	4.22	1.01	.24***	-.21***	.28***	.23***	.29***	.51***	.30***	-.26***	.40***	.37***	.37***	.68							
13. Gender	0.08	0.27	-.03*	-.01	-.01	-.04***	.01	.02	-.01	-.01	.01	-.03**	.01	.01	-						
14. Rank	0.46	0.50	.05***	-.11***	.06***	.03*	.08***	-.02*	.08***	-.10***	.07***	.05***	.09***	-.01	-.04***	-					
15. Age	27.3	6.31	.05***	-.14***	.07***	.03**	.10***	-.06***	.08***	-.13***	.07***	.05***	.09***	-.04***	-.03**	.52***	-				
16. Deployment	0.77	0.42	.02	.00	-.01	.03*	.01	.02	.05***	-.04***	.04**	.04***	.04**	.06***	-.04***	.08***	.04**	-			
17. DX for Mental Health Problems	0.05	0.21	-.08***	.06***	-.05***	-.07***	-.07***	-.08***	-.07***	.09***	-.05***	-.08***	-.09***	-.07***	.01	.01	.06***	.04***	-		
18. DX for Sub.Abuse Problems	0.02	0.13	-.03*	.03*	-.05***	-.02	-.04**	-.04***	-.02	.05***	-.05***	-.04***	-.04***	-.03**	-.01	-.05***	-.04***	-.02*	.16***	-	
19. Training	0.69	0.46	.03*	-.01	.00	.02	.04**	.02	.03**	-.03**	.03**	.03**	.04**	.04***	-.03*	.01	-.03*	.08***	-.01	-.06***	-

Notes: Numbers on the diagonal represent Cronbach's α. Rank is coded as 0 = Enlisted, 1 = NCO or Officer. Gender is coded as 0 = Male, 1 = Female. Deployment Status is coded as 0 = Non-deployed, 1 = Deployed. Training is coded as 0 = Non-training condition, 1 = Training condition. DX = Diagnosis.

*p<.05, **p<.01, *** p < .001

Table C2. Mediation Analysis: The Effects of Training on Diagnoses for Mental Health Problems							
Variable	Step 1: *X → DX for Mental Health Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Mental Health Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
(Intercept)	-3.19 (0.18)***	0.04	(0.03, 0.06)				
Age_1	0.05 (0.01)***	1.05	(1.04, 1.07)				
Rank	-0.28 (0.12)*	0.76	(0.59, 0.96)				
Gender	0.24 (0.19)	1.28	(0.88, 1.85)				
Deployment Status	0.48 (0.16)**	1.62	(1.17, 2.24)				
Training (*X*)	-0.12 (0.15)	0.89	(0.67, 1.19)				
Adaptability							
(Intercept)				3.71 (0.03)***	0.95 (1.38)	2.59	(0.17, 38.87)
Age				0.01 (0.00)***	0.06 (0.01)***	1.06	(1.04, 1.08)
Rank				0.07 (0.02)**	-0.25 (0.11)*	0.78	(0.62, 0.97)
Gender				-0.01 (0.04)	0.24 (0.18)	1.28	(0.90, 1.81)
Deployment Status				0.08 (0.02)***	0.55 (0.16)***	1.73	(1.27, 2.35)
$Adaptability_2$ (*m*)					-0.38 (0.06)***	0.68	(0.60, 0.77)
$Adaptability_2$ (*group mean, M*)					-1.11 (0.36)**	0.33	(0.16, 0.68)
Training (*X*)				0.05 (0.02)*	-0.04 (0.14)	0.96	(0.72, 1.27)
Catastrophizing							
(Intercept)				2.29 (0.03)***	-5.43 (0.63)***	0.00	(0.00, 0.02)
Age				-0.02 (0.00)***	0.06 (0.01)***	1.06	(1.04, 1.08)
Rank				-0.09 (0.03)***	-0.24 (0.12)*	0.78	(0.62, 0.99)
Gender				-0.05 (0.04)	0.28 (0.18)	1.33	(0.93, 1.89)
Deployment Status				-0.07 (0.03)*	0.55 (0.16)***	1.73	(1.27, 2.35)
$Catastrophizing_2$ (*m*)					0.38 (0.05)***	1.47	(1.33, 1.62)
$Catastrophizing_2$ (*group mean, M*)					0.96 (0.26)***	2.62	(1.55, 4.41)
Training (*X*)				-0.05 (0.03) †	-0.05 (0.14)	0.95	(0.72, 1.26)
(Table continues)							

Table C2. Mediation Analysis: The Effects of Training on Diagnoses for Mental Health Problems							
Variable	Step 1: *X → DX for Mental Health Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Mental Health Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
Character							
(Intercept)				3.50 (0.04)***	-2.66 (0.94)**	0.07	(0.01, 0.45)
Age				0.01 (0.00)***	0.05 (0.01)***	1.06	(1.04, 1.07)
Rank				0.09 (0.03)**	-0.25 (0.11)*	0.78	(0.63, 0.98)
Gender				0.06 (0.05)	0.25 (0.18)	1.29	(0.91, 1.82)
Deployment Status				0.06 (0.03)	0.47 (0.15)**	1.60	(1.18, 2.17)
$Character_2$ (*m*)					-0.21 (0.05)***	0.81	(0.74, 0.89)
$Character_2$ (*group mean, M*)					-0.14 (0.26)	0.87	(0.52, 1.45)
Training (*X*)				0.07 (0.03)*	-0.09 (0.14)	0.91	(0.69, 1.21)
Coping							
(Intercept)				3.50 (0.03)***	-2.00 (1.25)	0.13	(0.01, 1.58)
Age_1				0.01 (0.00)**	0.05 (0.01)***	1.06	(1.04, 1.07)
Rank				0.04 (0.02)	-0.25 (0.11)*	0.78	(0.62, 0.97)
Gender				-0.09 (0.04)*	0.19 (0.17)	1.21	(0.86, 1.70)
Deployment Status				0.07 (0.03)**	0.47 (0.15)**	1.60	(1.19, 2.16)
$Coping_2$ (*m*)					-0.35 (0.06)***	0.70	(0.63, 0.79)
$Coping_2$ (*group mean, M*)					-0.32 (0.35)	0.72	(0.36, 1.44)
Training (*X*)				0.05 (0.02)*	-0.09 (0.14)	0.91	(0.69, 1.21)
(Table continues)							

Table C2. Mediation Analysis: The Effects of Training on Diagnoses for Mental Health Problems							
Variable	Step 1: *X → DX for Mental Health Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Mental Health Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
Optimism							
(Intercept)				3.32 (0.03)***	-0.02 (1.28)	0.98	(0.08, 12.14)
Age_1				0.01 (0.00)***	0.06 (0.01)***	1.06	(1.04, 1.08)
Rank				0.09 (0.02)***	-0.23 (0.12)*	0.80	(0.64, 1.00)
Gender				0.04 (0.04)	0.27 (0.18)	1.31	(0.92, 1.86)
Deployment Status				0.04 (0.02)	0.51 (0.16)***	1.67	(1.23, 2.26)
$Optimism_2$ (*m*)					-0.48 (0.06)***	0.62	(0.54, 0.70)
$Optimsim_2$ (*group mean, M*)					-0.96 (0.38)*	0.38	(0.18, 0.81)
Training (*X*)				0.06 (0.02)*	-0.05 (0.14)	0.95	(0.71, 1.26)
Friendship							
(Intercept)				4.07 (0.04)***	-2.40 (1.06)*	0.09	(0.01, 0.72)
Age_1				-0.01 (0.00)***	0.05 (0.01)***	1.05	(1.03, 1.07)
Rank				0.02 (0.03)	-0.27 (0.11)*	0.76	(0.61, 0.95)
Gender				0.03 (0.05)	0.25 (0.18)	1.28	(0.91, 1.81)
Deployment Status				0.13 (0.03)***	0.52 (0.16)***	1.67	(1.23, 2.27)
$Friendship_2$ (*m*)					-0.23 (0.04)***	0.79	(0.73, 0.87)
$Friendship_2$ (*group mean, M*)					-0.19 (0.25)	0.83	(0.50, 1.36)
Training (*X*)				0.07 (0.03)*	-0.09 (0.14)	0.92	(0.69, 1.22)

Notes: Rank is coded as 0 = Enlisted, 1 = NCO or Officer. Gender is coded as 0 = Male, 1 = Female. Deployment Status is coded as 0 = Non-deployed, 1 = Deployed. Training is coded as 0 = Non-Training condition, 1 = Training condition. DX = Diagnosis.

†p<.07, *p<.05, **p<.01, *** p < .001

Table C3. Mediation Analysis: The Effects of Training on Diagnoses for Substance Abuse Problems							
Variable	Step 1: *X → DX for Substance Abuse Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Substance Abuse Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
(Intercept)	-3.11 (0.21)***	0.04	(0.03, 0.07)				
Age_1	-0.03 (0.02)	0.97	(0.94, 1.01)				
Rank	-0.64 (0.22)**	0.53	(0.34, 0.82)				
Gender	-0.28 (0.35)	0.75	(0.38, 1.49)				
Deployment Status	-0.26 (0.20)	0.77	(0.52, 1.16)				
Training (*X*)	-0.87 (0.19)***	0.42	(0.29, 0.61)				
Adaptability							
(Intercept)				3.71 (0.03)***	-4.91 (1.91)*	0.01	(0.00, 0.32)
Age				0.01 (0.00)***	-0.03 (0.02)	0.97	(0.94, 1.01)
Rank				0.07 (0.02)**	-0.63 (0.21)**	0.54	(0.36, 0.80)
Gender				-0.01 (0.04)	-0.28 (0.32)	0.75	(0.40, 1.42)
Deployment Status				0.08 (0.02)***	-0.29 (0.20)	0.75	(0.51, 1.10)
$Adaptability_2$ (*m*)					-0.10 (0.10)	0.91	(0.74, 1.11)
$Adaptability_2$ (*group mean, M*)					0.48 (0.50)	1.62	(0.60, 4.37)
Training (*X*)				0.05 (0.02)*	-0.89 (0.18)***	0.41	(0.29, 0.59)
Catastrophizing							
(Intercept)				2.29 (0.03)***	-3.85 (0.92)***	0.02	(0.00, 0.13)
Age				-0.02 (0.00)***	-0.02 (0.02)	0.98	(0.95, 1.01)
Rank				-0.09 (0.03)***	-0.60 (0.21)**	0.55	(0.36, 0.82)
Gender				-0.05 (0.04)	-0.25 (0.33)	0.78	(0.41, 1.47)
Deployment Status				-0.07 (0.03)*	-0.24 (0.20)	0.79	(0.54, 1.15)
$Catastrophizing_2$ (*m*)					0.28 (0.08)***	1.33	(1.13, 1.56)
$Catastrophizing_2$ (*group mean, M*)					0.32 (0.39)	1.37	(0.63, 2.98)
Training (*X*)				-0.05 (0.03) †	-0.84 (0.18)***	0.43	(0.30, 0.62)
(Table continues)							

Table C3. Mediation Analysis: The Effects of Training on Diagnoses for Substance Abuse Problems							
Variable	Step 1: *X → DX for Substance Abuse Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Substance Abuse Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
Character							
(Intercept)				3.50 (0.04)***	-5.46 (1.34)***	0.00	(0.00, 0.06)
Age				0.01 (0.00)***	-0.03 (0.02)	0.97	(0.94, 1.01)
Rank				0.09 (0.03)**	-0.60 (0.21)**	0.55	(0.36, 0.83)
Gender				0.06 (0.05)	-0.30 (0.33)	0.74	(0.39, 1.41)
Deployment Status				0.06 (0.03)	-0.29 (0.20)	0.75	(0.51, 1.10)
$Character_2$ (*m*)					-0.33 (0.07)***	0.72	(0.62, 0.84)
$Character_2$ (*group mean, M*)					0.64 (0.37)	1.90	(0.92, 3.95)
Training (*X*)				0.07 (0.03)*	-0.90 (0.18)***	0.41	(0.28, 0.58)
Coping							
(Intercept)				3.50 (0.03)***	-7.28 (1.70)***	0.00	(0.00, 0.02)
Age_1				0.01 (0.00)**	-0.03 (0.02)	0.97	(0.94, 1.01)
Rank				0.04 (0.02)	-0.62 (0.22)**	0.54	(0.35, 0.83)
Gender				-0.09 (0.04)*	-0.31 (0.33)	0.74	(0.38, 1.41)
Deployment Status				0.07 (0.03)**	-0.28 (0.20)	0.76	(0.51, 1.11)
$Coping_2$ (*m*)					-0.36 (0.10)***	0.70	(0.58, 0.84)
$Coping_2$ (*group mean, M*)					1.16 (0.47)*	3.18	(1.26, 8.07)
Training (*X*)				0.05 (0.02)*	-0.94 (0.18)***	0.39	(0.27, 0.56)
(Table continues)							

Table C3. Mediation Analysis: The Effects of Training on Diagnoses for Substance Abuse Problems							
Variable	Step 1: *X → DX for Substance Abuse Problems*			Step 2: *X → m*	Step 3 *X, m, M → DX for Substance Abuse Problems*		
	Coefficient	Odds Ratio	CI	Coefficient	Coefficient	Odds Ratio	CI
Optimism							
(Intercept)				3.32 (0.03)***	-4.97 (1.75)**	0.01	(0.00, 0.22)
Age_1				0.01 (0.00)***	-0.03 (0.02)	0.97	(0.94, 1.01)
Rank				0.09 (0.02)***	-0.61 (0.21)**	0.54	(0.36, 0.82)
Gender				0.04 (0.04)	-0.28 (0.32)	0.76	(0.40, 1.43)
Deployment Status				0.04 (0.02)	-0.29 (0.20)	0.75	(0.51, 1.10)
$Optimism_2$ (*m*)					-0.33 (0.11)**	0.72	(0.59, 0.89)
$Optimsim_2$ (*group mean, M*)					0.55 (0.51)	1.73	(0.63, 4.76)
Training (*X*)				0.06 (0.02)*	-0.89 (0.18)***	0.41	(0.28, 0.59)
Friendship							
(Intercept)				4.07 (0.04)***	-4.48 (1.47)**	0.01	(0.00, 0.21)
Age_1				-0.01 (0.00)***	-0.03 (0.02)	0.97	(0.94, 1.00)
Rank				0.02 (0.03)	-0.60 (0.20)**	0.55	(0.38, 0.81)
Gender				0.03 (0.05)	-0.27 (0.31)	0.76	(0.42, 1.39)
Deployment Status				0.13 (0.03)***	-0.27 (0.19)	0.77	(0.53, 1.10)
$Friendship_2$ (*m*)					-0.18 (0.07)*	0.84	(0.72, 0.97)
$Friendship_2$ (*group mean, M*)					0.34 (0.36)	1.40	(0.70, 2.83)
Training (*X*)				0.07 (0.03)*	-0.88 (0.17)***	0.41	(0.29, 0.58)

Notes: Rank is coded as 0 = Enlisted, 1 = NCO or Officer. Gender is coded as 0 = Male, 1 = Female. Deployment Status is coded as 0 = Non-deployed, 1 = Deployed. Training is coded as 0 = Non-training condition, 1 = Training condition. DX = Diagnosis.

†p<.07, *p<.05, **p<.01, *** p < .001

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