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For Psychological Health & Traumatic Brain Injury

Resilience and Prevention Study

Retrospective Outcomes Evaluation of the Soldier 360° Leader Comprehensive Fitness Course

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Table of Contents

Executive Summary5

Introduction8

 Overview of Soldier 360°9

 Rationale for the Evaluation of Soldier 360°10

 Purpose of the Evaluation11

Methods12

 Overview of Study Design12

 Screening Instruments and Study Variables13

 Statistical Analysis16

Results19

 Participant Characteristics19

 Effects of Soldier 360° on Symptoms of Psychopathology21

 Effects of Soldier 360° on Interference of Pain on Activity, Mood, Stress and Sleep24

 Effects of Soldier 360° on Satisfaction with Sleep, Problems Associated with Sleep, and Sleep Habits25

 Effects of Soldier 360° on Well-Being as Assessed by Attitudes Toward and Satisfaction With Health, Relationships and Quality of Life31

Discussion34

 Conclusions35

 Limitations and Recommendations37

 Future Directions38

Glossary of Acronyms and Key Terms39

References40

Appendices42

 Appendix A: Sample Program Schedule1

 Appendix B: Data Handling Procedures4

 Appendix C: Data Cleaning and Preparation16

 Appendix D: Study Variables18

 Appendix E: Between Subjects Main Effects of HPD Versus LPD21

 Appendix F: SCL-90-R ANOVA Table25

 Appendix G: Pain Assessment ANOVA Table28

 Appendix H: Sleep Assessment ANOVA Table29

 Appendix I: Changes In Attitudes Across 15 Domains Between Pre and Post Questionnaires30

 Appendix J: Satisfaction with Health, Relationships, and Quality of Life Domains ANOVA Table32

List of Figures

Figure 1. Level of evidence for Soldier 360° evaluation..... 10

Figure 2. Effects of Soldier 360° training on SCL-90-R T-scores for the interpersonal sensitivity and hostility indices.....23

Figure 3. Effects of Soldier 360° training on satisfaction with falling asleep, staying asleep and waking at the desired time27

Figure 4. Effects of Soldier 360° training on problems with daily function, quality of life and distress due to sleep problems 30

Figure 5. Effects of Soldier 360° training on satisfaction with marriage and financial situation ..34

List of Tables

Table 1. Demographic and military service characteristics across all participants and stratified by HPD and LPD groups..... 19

Table 2. Pre-post differences in SCL-90-R T-scores, all participants21

Table 3. Pre-post differences in SCL-90-R T-scores, HPD and LPD Participants.....22

Table 4. Pre-post differences in pain interference ratings, all participants.....24

Table 5. Pre-post differences in pain interference ratings, HPD and LPD participants.....25

Table 6. Pre-post differences in satisfaction with falling asleep, staying asleep and waking up at the desired time, all participants26

Table 7. Pre-post differences in satisfaction with falling asleep, staying asleep and waking up at the desired time, HPD and LPD participants26

Table 8. Pre-post differences in ratings of problems with daily function, quality of life and distress due to sleep problems, all participants28

Table 9. Pre-post differences in ratings of problems with daily function, quality of life and distress due to sleep problems, HPD and LPD participants29

Table 10. Pre-post changes in sleep habits, all participants30

Table 11. Pre-post distributions of fatigue, difficulty functioning, mood problems and physical symptoms after a poor night’s sleep, across all participants.....31

Table 12. Pre-post differences in satisfaction ratings of well-being as assessed by 15 domains of health, relationships and quality of life, all participants32

Table 13. Pre-post differences in satisfaction ratings of well-being as assessed by 15 domains of health, relationships and quality of life, HPD and LPD participants33

Executive Summary

Introduction

The Soldier 360° Leader Comprehensive Fitness Course (Soldier 360°) is a comprehensive, multi-disciplinary commanders' health and wellness course that targets senior non-commissioned officers (NCOs), grades E5 and above, who have had previous combat exposure. The course is both a primary psychological health intervention and a prevention program that provides NCOs with the training, tools, therapies and guidance to restore and enhance their personal psychological readiness, resilience, physical fitness, nutritional status, spiritual health and relationships. By raising awareness and insight, and providing the necessary skills in these areas, the program enables NCOs to better lead and support their soldiers.

This report presents findings of a study designed to measure the short-term effectiveness of Soldier 360° in improving symptoms of psychopathology, pain and sleep-related problems. The study also assessed whether the program impacted attitudes toward and satisfaction with psychological health, physical fitness, overall wellness, as well as familial, social and spiritual life.

Methods

This study used a pre-post study design to test the short-term effectiveness of Soldier 360°. Analyses were carried out on data routinely collected during program implementation. All data used for this evaluation were obtained using surveys administered at the Grafenwoehr military community (Grafenwoehr, Vilseck and Hohenfels) in Germany between March 2010 and December 2011 across several sessions of Soldier 360°. The specific objectives of this study were:

Objective One: Determine whether symptoms of psychopathology as measured by the Symptom Checklist-90-Revised (SCL-90-R) psychometric instrument were reduced by participating in Soldier 360°.

Objective Two: Determine whether Soldier 360° participation reduced the degree to which pain interferes with or affects general activity, mood, stress and sleep.

Objective Three: Determine whether satisfaction with sleep improved, problems with sleep were reduced and sleep habits changed by participating in Soldier 360°.

Objective Four: Determine whether well-being as measured by attitudes toward and satisfaction with health, relationships and quality of life improved by participating in Soldier 360°.

Furthermore, the effect of Soldier 360° was assessed between participants who exhibited symptoms associated with high and low levels of psychological distress as measured by their intake score on screening instruments for posttraumatic stress disorder (PTSD), depression and anxiety (improvements on the PTSD, depression and anxiety measures themselves could not

be tested since post-training data from the measures were unavailable). Hence the evaluation team examined pre- versus post-training differences and whether these differences varied based on the participant's level of psychological distress (high versus low psychological distress). Statistical significance of pre- versus post-training outcomes by psychological distress was assessed using mixed-models analysis of variance or tests of agreement (Bowker's and McNemar's tests) depending on the outcome variable of interest and distribution of the data. Effect sizes were also calculated.

Results

Findings for each stated objective are below.

Objective One: Symptoms of psychopathology

- Across all participants, statistically significant reductions were observed in SCL-90-R index scores for depression, hostility, interpersonal sensitivity, obsessive compulsiveness, paranoia, phobic anxiety, somatization and the global severity index by the end of Soldier 360° training. The size of the effect of these changes was generally small to moderate across all indices. Notably, however, relatively larger effect sizes were found for the global severity and hostility indices.
- The magnitude of the decrease in symptoms between pre- and post-training for the hostility and interpersonal sensitivity indices was significantly higher among high psychological distress participants as compared to the low psychological distress participants.

Objective Two: The degree to which pain interferes with or affects general activity, mood, stress and sleep

- No statistically significant improvements or changes were observed in the impact of pain on general functioning, mood, stress or sleep following participation in Soldier 360° training.

Objective Three: Satisfaction with sleep, problems associated with sleep, and sleep habits

- All participants reported significant improvements in their satisfaction with falling and staying asleep following participation in Soldier 360°. High psychological distress participants also reported a stronger magnitude of improvement in waking up at the desired time compared to low psychological distress participants. Low psychological distress participants were more satisfied with their sleep at pre-training, accounting for the weaker post-training changes in this distress group.
- All participants reported a significant improvement in the degree to which sleep problems affected daily functioning following program participation. High psychological distress participants also reported a significant reduction in the degree to which sleep problems caused distress, while low psychological participants did not.
- Despite sleep improvement gains among high psychological distress participants, even after participation in the Soldier 360 program, these participants reported significantly less satisfaction with sleep and reported that sleep problems interfered more with daily function, quality of life and caused more stress than low psychological distress participants. Low psychological distress participants had fewer sleep problems at pre-training, accounting for the weaker post-training changes in the low distress group.

Objective Four: Well-being, as measured by attitudes toward and satisfaction with health, relationships and quality of life

- For all participants, Soldier 360° participation significantly increased the reported importance assigned to command support, family diet, family relationships, general health, psychological health, occupation, quality of life, social support and spirituality.
- Significant improvements in satisfaction with children, family relationships, marriage, occupation, psychological health, quality of life, sexual relationships, social support, spirituality, diet, family diet, physical fitness and general health were found across all participants. The strongest effects were observed for fitness, sexual relationships and psychological health.
- High psychological distress participants reported a significantly greater magnitude of improvement in satisfaction with marriage and financial situation by the end of the training than did low psychological distress participants.

Conclusions and Recommendations

Findings indicate that participation in Soldier 360° improves attitudes and behaviors with respect to psychological health and overall well-being among NCOs, including those who entered the program with symptoms associated with psychological distress. It is important to note that the findings contained within this report represent short-term improvements as this study only examined the impact of Soldier 360° participation immediately after implementation, when retention rates would presumably be higher than any other time. Longer-term studies will be needed to determine whether the effects are sustained and whether the program may have a preventative effect among NCO participants who exhibited low psychological distress at the time of entering the Soldier 360 program but face adversities in the future. Also, an important question is whether fewer participants screened positive for PTSD, depression or anxiety by the end of training. This could not be assessed because measures of these conditions were only taken at intake but not at the completion of the course. The lack of a randomized sample as well as randomized control group that did not participate in Soldier 360° is also a significant limitation of the study; more rigorous study designs must be chosen for future studies to confirm present findings. Finally, psychometrically validated assessments of pain, sleep and attitudes towards and satisfaction with health, relationships and quality of life should also be considered for future evaluation studies to help confirm the validity of present study findings in these areas.

Introduction

Psychological injuries account for 10-15 percent of casualties in modern military operations (Thompson & McCreary, 2011). Effective training in stress management, psychological health and resilience are becoming more and more critical, not simply because of the reduced operational effectiveness and health care cost avoidance linked to military and combat-related stressors, but also the substantial individual toll these stressors exact on the psychological health and well-being of service members and their families.

Historically, the military has taken a largely didactic approach to addressing the prevention of psychological injuries, which often took the form of hands-off briefings, separate from the usual military training context (Thompson & McCreary, 2011). The other approach has been to screen for and treat psychological injuries, but only after they had already occurred. Although screening and treatment are essential, mitigating the risk of psychological injury will ultimately lead to better outcomes (Cornum, Mathews, & Seligman, 2011). Traditional prevention approaches such as briefings, however, are limited because they may not be meaningful to service members outside of their usual military training context and could even reinforce the stereotype that psychological problems reflect a flaw or deficit in character (Thompson & McCreary, 2011). For these reasons, hands-on, psychological health training seamlessly integrated into the traditional military training environment has been recommended (Thompson & McCreary, 2011). Furthermore, such training should not emphasize impairment, but rather human strength, potential and resilience (Cornum, Mathews, & Seligman, 2011).

In light of these recommendations and predicated on years of research suggesting that comprehensive life-style programs are effective in improving human performance and well-being, the chairman of the Joint Chiefs of Staff released an instruction on *Total Force Fitness* (TFF) in 2011 (United States, 2011). TFF is a comprehensive and holistic framework for improving readiness and well-being via eight key domains: physical, nutritional, medical, dental, behavioral, psychological, spiritual and social (Mullen, 2010). As part of TFF, there has been movement across services to develop holistic health programs designed to improve psychological resilience. One example is the U.S. Army's Comprehensive Soldier Fitness program which aims to increase psychological resilience through increasing physical, emotional, social, spiritual and family strengths through continuous self-development (Cornum, Mathews, & Seligman, 2011; Reivich & Seligman, 2011). The U.S. Air Force and U.S. Navy have also similarly developed Comprehensive Airman Fitness and Combat and Operational Stress Control programs, respectively.

Although numerous resilience programs are now underway across the services, only a small number of systematic studies have been conducted to evaluate the impact of these programs on key outcomes such as reducing symptoms of psychopathology, increasing sustained knowledge and acquired skills related to psychological health, improving personal resiliency and enhancing operational readiness (see Adler, Bliese, McGurk, Hoge, & Castro, 2009; Cohn & Pakenham, 2008; Lester, McBride, Bliese, & Adler, 2011 for examples). In a recent RAND report examining 23 U.S. military resilience programs, few had conducted and published formal evaluations using randomized control trial or quasi-experimental study designs to demonstrate the effectiveness and/or efficacy of their programs (Meredith et al., 2011). Moreover, evidence for the presumed effectiveness of a particular resilience program was often based on published studies in non-military populations. Hence there is little empirical evidence to suggest that resilience programs work, prompting the strong recommendation for more rigorous and comprehensive program evaluation (Meredith et al., 2011).

In light of the pressing need for evidence of effectiveness, the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury collaborated with Soldier 360° program administrators to perform a retrospective, short-term outcomes evaluation of Soldier 360°. The targeted population and program content of the Soldier 360° are described below, followed by the rationale and purpose of the evaluation.

OVERVIEW OF SOLDIER 360°

Soldier 360° is a comprehensive, multi-disciplinary commander's health and wellness course that targets senior non-commissioned officers (NCOs) in grades E5-E8. NCOs are nominated based on whether they have had previous combat exposure, are motivated and demonstrate leadership potential, and are not pending Permanent Change of Station, Expiration of Term of Service, Uniform Code of Military Justice or other adverse actions, and have at least one year of retainability. Using a holistic approach, Soldier 360° is both a primary psychological health intervention and a prevention program that provides NCOs with the skills and resources necessary to restore and enhance their own psychological readiness, resilience, physical fitness, nutritional status, spiritual health and relationships, as well as equips them to more effectively lead and support their Soldiers (United States Army, n.d.). The course provides access to care for NCOs who may not otherwise seek or receive care and creates a safe environment without stigma where the soldier leaders can develop skills designed to improve overall health and wellness. Although the program content is relevant to a wide range of populations, Soldier 360° intentionally targets NCOs because they are believed to have the greatest impact on the health and wellness of their soldiers (United States Army, n.d.).

Program Content

Soldier 360° consists of four main phases: Intake, Individual Health and Wellness, Relationship Health and Wellness, and Sustainment.

- **Phase I – Intake.** Soldier 360° staff members meet with soldiers to discuss the course and provide them with appointments for a Wellness Center Assessment and full physical examination by a primary care physician. During intake, soldiers are also administered an assessment battery that provides baseline data across a number of mental health and behavioral domains.
- **Phase II – Individual Health and Wellness.** A five-day, off-site training course in which NCOs learn about their own health and wellness as well as how to identify possible risk factors for stress in others. Individual biofeedback devices are issued for soldiers to practice and reinforce stress control techniques. Classes include yoga, physical fitness, injury prevention, stress management, pain management, sleep improvement, mindfulness and nutrition.
- **Phase III – Relationship Health and Wellness.** A five-day training that takes place in-garrison with a focus on maintaining healthy relationships. During this phase spouses are strongly encouraged to attend, though it is not required. Spousal participation rate varies by class, but is in the range of 15-20 percent (Col. M. Lopez, personal communication, Sept. 24, 2012). Classes include spirituality, sex and relationships, anger management, journaling, couples poetry, shield exercise, and individualized sessions on various topics, e.g., financial management.

- **Phase IV – Sustainment.** Weekly sessions, over a six month period, which afford NCOs to maintain their own psychological health and build resilience. Sessions include yoga, group discussions and feedback, and a presentation of expanded topics (United States Army, n.d.).

Soldier 360° tracks and evaluates changes in various aspects of participants' overall wellness using a battery of measures, assessments and instruments. This short-term outcomes evaluation focuses on measureable changes following Phases I, II and III. Schedules of activities for Phases II and III are provided in **Appendix A**.

Program Participants

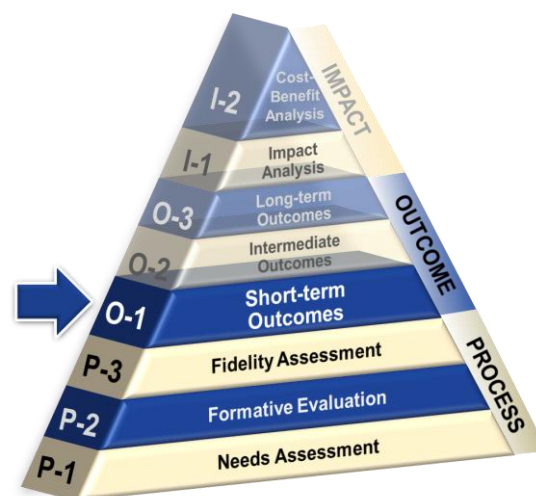
All NCO participants in Soldier 360° must share the following characteristics:

- Be nominated by his or her commander
- Be in grade E5 (P)-E8
- Have combat experience and preferably have been deployed within the previous 120 days
- Intend to remain in the Army
- Not be pending Permanent Change of Station or Expiration of Term of Service within six months following course completion
- Be motivated and have demonstrated leadership potential
- Not be pending any Uniform Code of Military Justice or other adverse actions
- Not have any major medical conditions prior to program entry; minor medical conditions or profiles are allowed

RATIONALE FOR THE EVALUATION OF SOLDIER 360°

The level of evidence to date for the effectiveness of Soldier 360° has not progressed beyond the process level (Figure 1). Outcome and impact studies (designed to demonstrate the effectiveness and efficacy of the program) have yet to be conducted. Two studies provide pilot-level outcome data. First, in March 2010, 10 NCOs with previous combat exposure were nominated by their commanding officers to attend a pilot implementation of Soldier 360°. A Proof of Concept Report generated by Europe Regional Medical Command following observations of the March 2010 pilot program indicated that overall course feedback was positive. Pre- and post-psychometric testing also indicated an improvement in all areas of psychological health and well-being. According to the data collected by the Army's Combined Arms Training Center, NCOs reported a positive change in their behavior, communication style, relationships and leadership approach (United States Army,

Figure 1. Level of evidence for Soldier 360° evaluation



* Adapted from the Substance Abuse and Mental Health Services Association (SAMHSA), Co-Occurring Center of Excellence Substance Abuse Treatment, 2007

2010a). However, the observations in the Proof of Concept Report sampled only 10 NCOs and therefore precluded conducting statistical tests. Hence, it does not achieve the level of rigor required to obtain the evidence necessary to meet the requirements of the next-phase outcomes evaluation.

Second, from September 6-17, 2010, the Office of the Assistant Chief of Staff for Installation Management (OACSIM) Soldier and Family Readiness Division conducted a systematic observation of Soldier 360° (United States Army, 2010b). Forty-one NCOs and respective spouses who were in attendance provided feedback via a standardized questionnaire on the overall course, topic quality and quantity, and how they planned to use the information in their personal lives and with their units. OACSIM reported that feedback from NCOs on Soldier 360° was “consistently positive with clear indications of application both in their personal lives and units.” This study, however, did not examine psychological health outcomes or well-being.

Although encouraging, the results of these early assessments require follow-up with a more systematic study that examines the impact of Soldier 360° on psychological health and well-being on a larger sample of participants. In order to progress from process-focused evidence to outcomes-focused evidence a Short-term Outcomes Evaluation (i.e., Level O-1 as indicated by the arrow in Figure 1) is required. This retrospective, pre/post short-term outcomes study, was designed as a first step to obtain this level of evidence in support of Soldier 360°.

PURPOSE OF THE EVALUATION

The present study is designed to evaluate Soldier 360° by using de-identified data collected from previous program sessions at the Grafenwoehr military community (Grafenwoehr, Vilseck and Hohenfels) in Germany. Based on the stated objectives of Soldier 360°, this set of analyses can also be used to help Soldier 360° program developers assess the progress and effectiveness of current program implementation from the participant’s point of view. Given limited data on training programs that target an individual’s holistic health, the larger purpose is to help assess whether the overall Soldier 360° approach is effective.

Evaluation Objectives

This study is designed to build upon the existing evidence base by evaluating the short-term effectiveness of Soldier 360° as defined by measurable outcomes before and after program implementation (a pre/post design). “Short-term” refers to outcomes measured immediately upon completion of the two week program. The specific objectives of this study are to:

1. Determine whether symptoms of psychopathology as measured by the SC-90-R psychometric instrument were significantly reduced by participating in Soldier 360°.
2. Determine whether Soldier 360° participation significantly reduced the degree to which pain interferes with or affects general activity, mood, stress and sleep.
3. Determine whether satisfaction with sleep improved, problems with sleep were significantly reduced, and sleep habits significantly improved following participation in Soldier 360°.
4. Determine whether attitudes toward and satisfaction with health, relationships and quality of life significantly improved following participation in Soldier 360°.

Hypotheses

The primary hypothesis was that participation in Soldier 360° would lead to significantly diminished symptoms of psychopathology, reduced problems associated with pain, improved sleep and enhanced attitudes towards, and satisfaction with, psychological health, physical fitness, overall wellness, and familial, social and spiritual life across all service members who participated in the training.

Further, it was hypothesized the program would be of greater benefit to those who enter the program with relatively high levels of psychological distress compared to participants who entered the program with little to no symptoms of psychological distress. In other words, it was hypothesized that the program might be most beneficial for those with higher symptoms of psychological distress since they might stand to gain the most from the program (i.e., because they are more likely to have symptoms of psychopathology, problems with pain and sleep, and less satisfaction with their health, relationships and quality of life upon entry into the program). Participants who enter without signs of psychological distress are likely to have relatively fewer symptoms of psychopathology, problems with pain or sleep, and greater satisfaction with their health, relationships and quality of life and therefore are likely to show relatively smaller changes in these areas by the end of training.

With respect to attitudes toward and satisfaction with health, relationships and quality of life, it was hypothesized that Soldier 360° would lead to improvements regardless of level of psychological distress. However, with respect to satisfaction in these areas, it was hypothesized again that participants with relatively high levels of psychological distress would be the least satisfied with these areas of well-being at the beginning of the program and therefore would show relatively larger gains in feelings of well-being by the end of training than those with fewer to no symptoms of psychological distress.

To test these hypotheses, a pre/post study design was applied to assess changes in the symptoms of psychopathology, as well as the aforementioned health and well-being measures across the entire participant sample. Follow-up analyses were conducted to determine whether the magnitude of these changes significantly differed across participants with high versus low levels of psychological distress.

Methods

In this section we provide an overview of the study design, followed by a detailed description of the study variables and statistical analyses conducted to answer the four study objectives.

OVERVIEW OF STUDY DESIGN

This retrospective study used a quasi-experimental study design that analyzed existing program outcomes data routinely collected before and after Soldier 360° program implementation. All data used for this evaluation was collected using standardized surveys administered at the Grafenwoehr military community in Germany between March 2010 and December 2011. NCOs completed surveys upon entering into the program and at the end of the two-week training program. Hence, this study compared outcomes before and after the main training program, but not sustainment, since data was not collected during the sustainment sessions. Surveys

completed upon entry are referred to as “pre” and those completed at the end of training are referred to as “post.”

Pre- and post- differences in screening instrument scores (described in more detail below) were examined across all participants. The cohort of participants was also divided into two groups, high versus low psychological distress respectively, based on whether they presented above or below clinical consideration threshold on standardized instruments designed to assess symptoms associated with psychological distress. More specifically, high psychological distress was determined when participants scored in the moderate to severe range on screening instruments for posttraumatic stress disorder – as measured by the PTSD Checklist (PCL-M), depression – as measured by the Beck Depression Inventory (BDI), and/or anxiety – as measured by the Beck Anxiety Inventory (BAI). Whether pre-post effects of participation in Soldier 360° differed according to whether participants were identified as exhibiting high psychological distress according to this criteria, versus low psychological distress (i.e. below clinical consideration threshold on clinical symptom screeners), were tested.

For the majority of study questions, a “mixed-model” study design was used to test the effect of program participation (i.e., pre versus post), on symptoms of psychological distress (i.e., high versus low), and the interaction between the two.

SCREENING INSTRUMENTS AND STUDY VARIABLES

Among the data routinely collected as part of Soldier 360°, data from two sets of instruments were analyzed for this report:

- **Pre- and Post- Questionnaires:**
 - Demographic and military service information
 - Symptom Checklist-90-Revised – a valid and reliable instrument designed to assess a broad range of symptoms associated with psychological distress. The SCL-90-R has nine subscales (described in greater detail below). The average of all nine subscales is the Global Severity Index, which can be used as a summary of the test, reflecting overall psychological distress.
 - A sleep assessment, comprised of questions designed by Soldier 360° administrators to assess for amount and quality of sleep as well as sleep habits
 - A pain assessment, comprised of questions designed by Soldier 360° administrators to assess the degree to which pain interferes with general functioning, mood, stress and sleep
 - Assessment of attitudes towards and satisfaction with 15 domains of health, relationships and quality of life
- **Psychological health measures (pre-training only):**
 - The PTSD checklist – Military Version
 - Beck’s Depression Inventory
 - Beck’s Anxiety Inventory

The study variables contained within these instruments that were analyzed are described in greater detail below. In addition, **Appendix B** provides a detailed description of the study data set: **Appendix B1** contains the de-identification strategy, data protection protocol, and data transfer procedures, and **Appendix B2** contains a complete list of all data elements extracted by the program and used for this study, including the strategy applied to demographic and

military service characteristics to minimize risk for potential identifiability of past participants. Details regarding the data cleaning and preparation procedures are provided in **Appendix C**.

Participant Demographic and Military Service Characteristics

This study included 486 participants from 14 different sessions of Soldier 360°. Demographic variables included gender, age (40 years of age [yrs] and above, 35-39 yrs, 30-34 yrs, 25-29 yrs, and <20-24 yrs), educational attainment (two-year associate's/bachelor's degree, some college, high school, and GED), and marital status (married, single, divorced/other).

Military service variables included rank (E7/E8/Officer/GS, E5/E6, <=E4), deployment frequency (0, 1-2, >=3 deployments), blast exposures (0, 1-2, 3-4, >=5 exposures), and military occupation specialty (MOS-Armor, artillery, infantry, maintenance, medical, support or other). Demographic and military service characteristics included in this evaluation are summarized in **Appendix D** along with the associated units of measurement.

Psychological Distress

In order to test whether Soldier 360° could benefit soldiers entering the program with symptoms associated with psychological distress, participants were categorized into **high psychological distress** and **low psychological distress** groups. Participants who scored at the cut-off for clinical consideration or greater on one or more of the measures for PTSD (PCL-M; cut-off=44), depression (BDI; cut-off=17), or anxiety (BAI; cut-off=16) were classified as **HPD participants**. Participants who scored lower than the cut-off on all of the three instruments were classified as **LPD participants**.

The cut-off for the PCL-M is the upper limit of the scores recommended by the U.S. Department of Veterans Affairs (VA) National Center for PTSD to screen for PTSD in VA primary care and specialized medical clinics such as traumatic brain injury (TBI) or pain (U.S. Department of Veterans Affairs, n.d.). The cut-offs for the BDI and BAI are in the mild to moderate range for depression (Beck, Steer, & Carbin, 1988) and moderate range for anxiety (Marques L. et al, 2010), respectively. The PCL-M (Weathers & Ford, 1996), BDI (Beck, Steer, & Carbin, 1988) and BAI (Beck, Brown, Epstein, & Steer, 1988), are well-validated measures of PTSD, depression, and anxiety which are routinely used in the screening of these conditions in clinical and counseling settings. It is important to note, however, that meeting the cut-off score on any of these instruments as administered in the Soldier 360° program does not imply in any way a psychiatric diagnosis. That is, meeting the cut-off score only suggests the presence of elevated symptoms associated with PTSD, depression and/or anxiety at the time the screening was administered. Each scale is described further in **Appendix D**.

Symptoms of Psychopathology, Pain Assessment and Sleep Assessment

Symptoms of Psychopathology

Symptoms of psychopathology were assessed using the Revised Symptom Checklist-90 Instrument. The SCL-90-R is a well-validated and reliable instrument routinely used to assess symptoms of psychopathology (Derogatis, Lipman, & Covi, 1973). The SCL-90-R consists of 90 questions related to nine domains of psychopathology: anxiety, depression, hostility, interpersonal sensitivity, obsessive compulsive, paranoia, phobic anxiety, psychoticism and somatization. Respondents score each symptom from zero to four based on the level of distress related to the symptom (0=not at all; 4=extremely). A raw score is calculated for each domain

based on a weighted sum of scores on the questions related to the domain. A Global Severity Index, representing overall levels of psychological distress, is also calculated based on the mean value of the all item responses (Derogatis, 1983). Raw scores are converted to a standardized T-score, which is calculated by referring to population-based norm tables from prior samples of non-patients provided in the SCL-90-R manual. A T-score of 50 is equivalent to the normal population and T-scores from 40 to 60 are considered to fall within the normal range of psychological symptoms.

Pain

Pain questions from the intake and follow-up questionnaires were analyzed:

1. "Are you experiencing pain?" (Yes/No)
2. The degree to which pain interferes with: 1) general activity, 2) mood, 3) level of stress, 4) sleep

Responses to each of the second set of four pain-related questions are scored on a 10-point Likert scale where a score of "0" corresponds to "Does not interfere" and "10" corresponds to "Completely interferes." The pain assessment was developed by Soldier 360° and has not been validated in a military population.

Satisfaction With and Problems Associated with Sleep

Five sleep questions included in the Soldier 360° program intake and follow-up questionnaire were analyzed. Sleep areas assessed include:

1. Subjectively valued importance of sleep (scored as, "not important," "important," and "extremely important")
2. Satisfaction with ability to fall asleep, stay asleep, and "wake up when you need to wake up"
3. Sleep problems interfering with functioning, quality of life and causing distress
4. Ten sleep habits: avoiding caffeine, nicotine, having alcohol, engaging in intense exercise, having a wind-down routine, sleeping in a comfortable environment, sleeping the same length of time each night, waking up at the same time, moving to another room if unable to sleep, and using the bedroom for non-sleep/sex activities
5. Symptoms and impacts to functioning after poor night's sleep (daytime fatigue, difficulty functioning, mood problems, physical symptoms)

The sleep satisfaction questions are scored on a six-point scale. In this case, a "-3" corresponded to an answer of "Very dissatisfied," a "-2" with "Somewhat dissatisfied," and a "-1" with "A little dissatisfied." Positive answers are scored as "1" for "A little satisfied," "2" for "Somewhat satisfied," and "3" for "Very satisfied."

The interference of sleep questions are scored on a 10-point Likert scale where a score of "0" corresponds to an answer of "Not at all" and a "10" corresponds to an answer of "Very much interfering."

The sleep habit questions are binary "Yes/No" questions which asked the respondents whether they engage in the habits listed above.

The sleep functioning questions were scored based on the number of positive responses to categories of symptoms in each individual case. For each category, respondents were asked to indicate all the symptoms that they experience after a poor night's sleep by checking all the boxes that applied. The possible responses for each symptom category are:

- Daytime fatigue: “tired,” “exhausted,” “washed-out” and “sleepy”
- Difficulty functioning: “performance impaired work/daily chores,” “difficulty concentrating” and “memory problems”
- Mood problems: “irritable,” “tense,” “nervous,” “groggy,” “depressed,” “anxious,” “grouchy,” “hostile,” “angry” and “confused”
- Physical symptoms: “muscle aches/pain,” “light headed,” “headache,” “nausea,” “heartburn” and “muscle tension”

All five questions comprising the sleep assessment were developed by Soldier 360° and have not been validated in a military population. All items from the SCL-90-R, pain assessment and sleep assessment (administered as a part of the pre- and post-questionnaires) that were included as outcome variables are provided in **Appendix D**.

Attitudes Toward and Satisfaction with Health, Relationships and Quality of Life

Attitudes toward and satisfaction with 15 domains of health, relationships and quality of life were examined from the pre- and post-questionnaires: children, family relationships, marriage, command support, financial situation, occupation, psychological health, quality of life, sexual relationships, social support, spirituality, diet, family diet, fitness and general health.

Each set of questions had two components – an “Importance” question that assessed how important the domain is to the respondent and a “Satisfaction” component that assessed how satisfied the respondent is with the domain.

The importance question has three categories: “Not important,” “Important,” and “Extremely important.” The satisfaction questions are scored on a six-point scale where a score of “-3” corresponds to an answer of “Very dissatisfied”, a “-2” with “Somewhat dissatisfied” and a “-1” with an “A little dissatisfied.” Positive answers are scored as “1” as “A little satisfied,” a “2” as “Somewhat satisfied” and a “3” with an answer of “Very satisfied.” All attitudes and satisfaction items are provided in **Appendix D**.

STATISTICAL ANALYSIS

Demographic and Military Service Characteristics

Descriptive statistics, frequency and percentage of participants across all demographics (i.e., gender, age, educational attainment and marital status) and military service variables (i.e., rank, number of deployments and number of blast exposures) were calculated. Chi-square tests were conducted on each variable to test for differences in demographic and military service characteristics between HPD and LPD groups.

Statistical Analyses of Psychopathology, Pain and Sleep Variables

For each question analyzed, only participants who answered the corresponding question on both the pre- and post-questionnaires were included in the sample. Therefore, sample sizes varied from question to question. For all statistical tests, statistical significance was set at $\alpha=0.05$.

Symptoms of Psychopathology

Means and standard deviations (*SD*) were calculated for each symptom of psychopathology index and the global indices from the SCL-90-R. Mixed model analysis of variance (ANOVA) was used to test for the within-subject main effect of session (i.e., pre- versus post-training across all participants), the between-subject main effect of psychological distress (i.e., overall effect of HPD versus LPD collapsed over pre- and post-training sessions) and the interaction between psychological distress and session, for each index. Statistical significance of main effects and interactions is based on the “*F*” statistic. Statistical significance was set at $\alpha = 0.05$ for all *F*-tests. The effect-size for main effects and interactions was evaluated by examining partial eta-squared (η^2_p)¹ which indicates the proportion of variance accounted for by the main effect or interaction. Effect sizes of .02 or less was considered to be small, 0.13 medium and 0.26 as large (Bakeman, 2005).

Significant interactions were followed up by post-hoc simple effects tests that assessed whether the pre-post effect differed between HPD and LPD groups. Simple effects tests were carried out using one-way repeated measures ANOVA on the pre- versus post-difference within HPD and LPD groups. η^2_p was examined to evaluate whether the effect of the pre- versus post- difference was qualitatively different in magnitude between HPD and LPD groups.

Because the between-subject main effect of psychological distress was of secondary interest to the study, the means, *SDs*, and *F*-tests associated with this effect are presented in **Appendix E**.

Pain

The McNemar’s χ^2 -test was used to determine whether the proportion of participants who answered “Yes” versus “No” changed from pre- to post-training for the question “Are you experiencing pain?” McNemar’s is a test of agreement that determines whether the proportion of participants before and after an intervention or treatment changes on a measure with binary categories (e.g., yes or no). Statistical significance was set at $\alpha = 0.05$ for the McNemar’s χ^2 -test.

Means and *SD* were calculated for each question on pain interfering with general activity, mood, stress or sleep. Mixed model ANOVA was used to test for main effects of session, psychological distress and their interaction, as described for symptoms of psychopathology. Significant interactions were followed with simple effects tests. Statistical significance was set at $\alpha = 0.05$ for all *F*-tests.

Because the between-subject main effect of psychological distress was of secondary interest to the study, the means, *SDs*, and *F*-tests associated with this effect for all pain variables are presented in **Appendix E**.

Sleep

Importance of sleep. For the importance of sleep question, Bowker’s χ^2 -test was used to determine whether the proportion of participants who answered “not important,” “important” or “extremely important” changed between pre- and post-training. Bowker’s test is a test of agreement that assesses whether the proportion of participants changes before and after an intervention or treatment on a measure with more than two categorical response options (e.g.,

¹ η^2_p is calculated as the effect sum of squares divided by the total of the effect sum of squares and error sum of squares (Olejnik & Algina, 2003).

“not important,” “important” or “extremely important”). Statistical significance was set at $\alpha = 0.05$ for the Bowker’s χ^2 -test.

Sleep satisfaction and sleep problems. Means and *SD* were calculated for each sleep satisfaction question (satisfaction with ability to fall asleep, stay asleep, and wake up) and sleep problem question (degree to which sleep interfered with functioning, quality of life, or caused distress). Mixed model ANOVA was used to test for main effects of session, psychological distress, and the interaction between session and psychological distress, as described for symptoms of psychopathology. Significant interactions were followed with simple effects tests. Statistical significance was set at $\alpha = 0.05$ for all *F*-tests.

Because the between subject main effect of psychological distress was of secondary interest to the study, the means, *SDs*, and *F*-tests associated with this effect are presented in **Appendix E**.

Sleep habits. For the 10 sleep habit items listed in Table 3, McNemar’s test was used to determine whether the proportion of participants who answered “Yes” versus “No” changed from pre- to post-training.

Symptoms of a poor night’s sleep. For each broad category of symptoms after a poor night’s sleep (i.e., daytime fatigue, difficulty functioning, mood problems and physical symptoms), the frequency of all participants who reported at least one of the corresponding symptoms was calculated. For example, a participant was counted as having daytime fatigue if he or she checked yes for any of the “tired,” “exhausted,” “washed-out,” or “sleepy” symptoms. The frequency and proportions of all participants meeting criteria for each of the broad categories was then calculated. No statistical tests could be performed because there was no question explicitly asking whether participants experienced a poor night’s sleep. Hence, the number of participants experiencing a poor night’s sleep at pre- versus post-training was unknown, preventing the determination of changes in symptoms among those reporting poor night’s sleep.

Statistical Analysis of Health, Relationships and Quality of Life Domains

Importance of Health, Relationships and Quality of Life Domains

Bowker’s χ^2 -test was applied to determine whether the proportion of participants assigning a particular level of importance to each of the 15 domains of health, relationships and quality of life (i.e., “not important,” “important,” or “extremely important”) changed significantly from pre- to post-training. Statistical significance was set at $\alpha = 0.05$ for the Bowker’s χ^2 -test.

Satisfaction with Health, Relationships and Quality of Life Domains

For each satisfaction question, means and *SD* were calculated. Mixed model ANOVA was conducted to test for main effects of session, psychological distress, and the interaction between session and psychological distress (as described for symptoms of psychopathology). Significant interactions were followed with simple effects tests. Statistical significance was set at $\alpha = 0.05$ for all *F*-tests.

Because the between subject main effect of psychological distress was of secondary interest to the study, the means, *SDs*, and *F*-tests associated with this effect for all satisfaction variables are presented in **Appendix E**.

Results

Participant characteristics, including demographic and military service characteristics, as well as psychological distress are described in the section below followed by the results of each of the evaluation objectives.

PARTICIPANT CHARACTERISTICS

Demographics and Military Service Characteristics

The demographic and military service characteristics of all participants, stratified by high and low psychological distress groups, are summarized in Table 1. The majority of the participants were married males between the ages of 25 and 34 years, attended some college, ranked E5/E6, in an infantry specialty, and had been deployed at least once during their military career.

In terms of between-group differences, chi-square tests indicated that participants who were identified as having high psychological distress were more likely to be over the age of 30, have experienced more deployments, and to have experienced more exposures to blasts than those with low psychological distress. There were no differences in any other demographic or military service characteristics between HPD and LPD groups (Table 1).

Table 1. Demographic and military service characteristics across all participants and stratified by HPD and LPD groups

Characteristic	All Participants		HPD		LPD		Chi-Square Test			
	<i>n</i>	%	N	%	N	%	χ^2	df	<i>p</i>	
<i>Gender</i>										
Male	438	90.1	100	89.3	324	90.3	0.09	1	0.77	
Female	48	9.9	12	10.7	35	9.8				
<i>Age</i>										
40 years and above	57	11.8	19	17.0	37	10.3	11.37	4	0.02*	
35-39 year	70	14.5	16	14.3	52	14.5				
30-34 years	125	25.9	37	33.0	84	23.4				
25-29 years	169	35.0	32	28.6	131	36.5				
<20-24 years	62	12.6	8	7.1	52	14.5				
Missing	3									
<i>Educational Attainment</i>										
2-yr Associates/Bachelors	59	12.5	15	13.4	43	12.0	1.27	3	0.73	
Some college	273	57.6	62	55.4	207	57.7				
High School	110	23.2	24	21.4	82	22.8				
GED	32	6.8	10	8.9	22	6.1				
Missing	12									
<i>Marital Status</i>										
Married	349	72.0	81	16.7	258	53.1	0.132	2	0.94	

Soldier 360° Evaluation Final Report

Single	91	18.8		20	4.1		68	14.0			
Divorce/Other	45	9.3		11	2.3		32	6.6			
Missing	1										
<i>Rank</i>											
E7/E8/O/GS	73	15.0		17	15.2		55	15.3	0.025	2	0.99
E5/E6	383	78.8		88	78.6		283	78.8			
<=E4	30	6.2		7	6.3		21	5.9			
<i>Deployment Frequency</i>											
>=3	158	38.6		44	39.3		110	30.6	6.27	2	0.04*
1-2	241	58.9		49	43.8		183	51.0			
0	10	2.4		5	4.5		5	1.4			
Missing	77										
<i>Blasts</i>											
>5	68	19.8		23	20.5		42	11.7	15.99	3	0.001*
3-4	51	14.8		20	17.9		29	8.1			
1-2	84	24.4		19	17.0		61	17.0			
0	141	41.0		22	19.6		115	32.0			
Missing	142										
<i>MOS</i>											
Armor	39	8.3		9	8.0		30	8.4	2.67	6	0.85
Artillery	36	7.6		8	7.1		26	7.2			
Infantry	129	27.4		32	28.6		94	26.2			
Maintenance	55	11.7		12	10.7		39	10.9			
Medical	34	7.2		6	5.4		27	7.5			
Support	38	8.1		6	5.4		31	8.6			
Other	140	29.7		37	33.0		100	27.9			
Missing	15										

HPD=High Psychological Distress, LPD=Low Psychological Distress

Psychological Distress

Complete data for the PCL-M, BDI, and BAI were available for 471 participants. Of these 112 (23.8%) were classified as HPD, i.e., they scored 44 or greater on the PCL-M, 17 or greater on the BDI, or 16 or greater on the BAI.

Of the 477 who completed the PCL-M, 66 (13.8%) met the criteria for PTSD-like symptoms. Of the 475 who completed the BDI, 75 (15.8%) met criteria for moderate to severe symptoms of depression. Of the 477 who completed the BAI, 46 (9.6%) met criteria for moderate to severe symptoms of anxiety.

EFFECTS OF SOLDIER 360° ON SYMPTOMS OF PSYCHOPATHOLOGY

The following sections describe the results of the analyses conducted on standardized scores converted from SCL-90-R responses. Pre- and post-training differences are shown first for all participants followed by HPD and LPD groups.

Pre versus Post Differences, All Participants

Sample sizes, means, *SDs*, *F*-statistics, and effect sizes for the nine domains and the Global Severity Index of the SCL-90-R for all participants are shown in Table 2.

Across the cohort as a whole, a reduction in scores across all SCL-90-R indices was observed at the end of Soldier 360° training (Table 2). Mixed model ANOVA revealed a significant main effect of participation in the Soldier 360° program for reductions in depression, hostility, interpersonal sensitivity, obsessive compulsive, paranoia, phobic anxiety, psychoticism, somatization, and The Global Severity Index. In other words, results indicated that following completion of the Soldier 360° program, there was a significant reduction in psychological distress scores as measured by the SCL-90-R (Table 2). Participants did not demonstrate a significant reduction in standardized scores for the anxiety index. Examination of the effect sizes in Table 2 indicates that the largest changes were observed for the hostility index and the Global Severity Index, or overall symptoms of psychological distress.

Table 2. Pre/post differences in SCL-90-R T-scores, all participants

SCL-90-R Domain	<i>n</i>	All Participants		Session Main Effect ¹	
		Pre Mean (<i>SD</i>)	Post Mean (<i>SD</i>)	<i>F</i>	Effect Size η^2_p
Anxiety	316	50.24 (10.78)	49.67 (11.46)	2.68	0.01
Depression	319	53.83 (10.39)	50.64 (10.96)	39.46**	0.11
Hostility	318	55.47 (11.12)	51.71 (10.74)	49.85**	0.14
Interpersonal Sensitivity	312	52.69 (9.98)	50.53 (9.49)	23.53**	0.07
Obsessive Compulsive	302	55.62 (10.29)	51.90 (10.80)	35.71**	0.11
Paranoia	331	53.11 (10.84)	50.44 (10.5)	27.59**	0.08
Phobic Anxiety	326	54.48 (9.78)	52.76 (9.29)	11.99**	0.04
Psychoticism	325	52.67 (9.49)	50.98 (9.80)	8.20**	0.03
Somatization	327	52.95 (10.89)	50.54 (11.05)	24.02**	0.07
Global Severity Index	305	54.58 (10.69)	50.53 (11.98)	45.26**	0.13

p* < 0.05, *p* < 0.001

¹Indicates *F*-test for the pre versus post difference across all participants.

Pre- versus Post-Differences by HPD and LPD Groups

Sample sizes, means, *SDs*, *F*-statistics, and effect sizes for the nine domains and Global Severity Index of the SCL-90-R stratified by HPD and LPD groups are shown in Table 3.

Not surprisingly, across all indices, HPD participants had significantly higher SCL-90-R scores than LPD participants both pre- and post-training (see **Appendix D** Table 1 for between-groups ANOVA results of HPD versus LPD). This finding is expected as it indicates that those who were identified as having high psychological distress through the PTSD, depression and anxiety symptom measures also reported significantly higher levels of clinical distress on the SCL-90-R, a measure designed to capture a broad range of psychological distress symptoms. Conversely, as would be expected, SCL-90-R scores among participants in the low distress group (LPD) were within the normal range (40-60) across all domains and Global Severity Index of the SCL-90-R at both pre- and post-training, however even the low psychological distress group did show a significant decrease in psychological health symptoms following participation in Soldier 360 (Table3). In addition, a significant interaction between program participation and levels of psychological distress (i.e. the HPD versus LPD groups) was found for the hostility ($F(1,311)=6.02, p=0.0147$) and interpersonal sensitivity ($F(1,305)=6.32, p=0.0125$) indices, meaning that in these two indices individuals who showed higher psychological distress showed greater improvement post participation in the Soldier 360° program than those with lower psychological distress. No other significant interactions were found, including the Global Severity Index, the overall measure of psychological distress on the SCL-90-R.

Table 3. Pre/post Soldier participation differences in SCL-90-R T-scores, HPD and LPD Participants

SCL-90-R Domain	HPD			LPD			Session x Psychological Distress Interaction ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	F	Effect Size η^2_p
Anxiety	63	59.95 (10.92)	57.92 (12.97)	248	47.98 (9.32)	47.77 (10.11)	1.78	0.006
Depression	68	64.37 (8.62)	59.87 (10.84)	246	51.20 (8.81)	48.33 (9.58)	1.91	0.010
Hostility	70	65.39 (9.10)	59.17 (10.73)	243	52.76 (10.03)	49.75 (9.82)	6.02*	0.020
Interpersonal Sensitivity	60	60.82 (9.88)	56.08 (9.92)	247	50.87 (9.03)	49.37 (8.92)	6.32*	0.020
Obsessive Compulsive	54	65.11 (9.20)	60.65 (9.55)	243	53.67 (9.32)	50.17 (10.11)	0.52	0.002
Paranoia	77	62.19 (11.29)	57.69 (12.03)	249	50.48 (9.08)	48.37 (8.96)	3.61	0.010
Phobic Anxiety	73	61.68 (10.26)	58.78 (10.93)	248	52.46 (8.64)	51.10 (8.04)	1.59	0.005
Psychoticism	73	61.44 (8.98)	59.56 (11.25)	248	50.30 (8.08)	48.63 (7.85)	0.03	<0.001
Somatization	73	61.44 (10.70)	57.64 (11.60)	249	50.67 (9.63)	48.62 (10.03)	2.13	0.007
Global Severity Index	55	65.62 (8.57)	60.82 (10.91)	245	52.40 (9.42)	48.49 (10.97)	0.47	0.002

* $p < 0.05$; HPD=High Psychological Distress, LPD=Low Psychological Distress

¹Indicates F-test for whether the pre-post difference differed between HPD and LPD participants

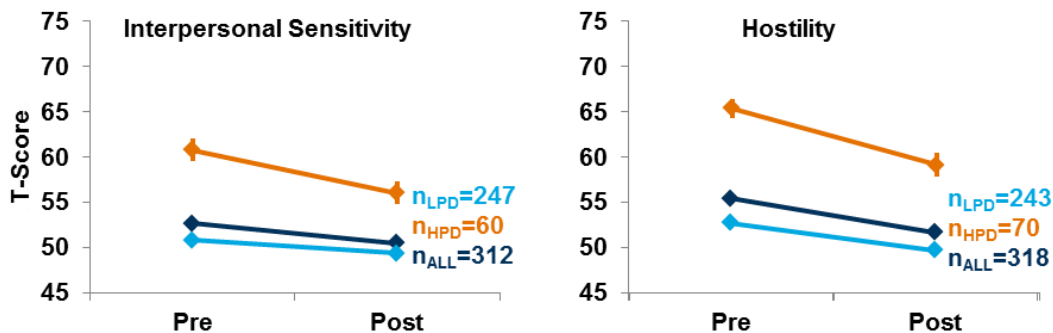
Post-hoc simple effects tests on the hostility index standardized scores revealed a significant difference between pre- and post-training in both psychological distress groups (HPD: $F(1,69)=28.24, p < .001$; LPD: $F(1,242)=23.94, p < .001$). However, the effect size η^2_p for the pre-

post-effect among HPD participants was 0.29 (large effect), and only 0.09 (small to medium effect) for LPD participants. Therefore, although both HPD and LPD groups demonstrated a significant reduction in hostility index scores, the magnitude of change was much larger in HPD participants than in LPD participants, accounting for the significant interaction.

Post-hoc simple effects tests on the interpersonal sensitivity index standardized scores revealed a significant difference between pre- and post- training in both psychological distress groups (HPD: $F(1,59)=12.09, p<.01$; LPD: $F(1,246)=7.72, p<.01, LPD$). However, the effect size η^2_p for the pre/post effect in HPD participants was much larger (0.17) than the effect size η^2_p for LPD participants (0.03). Therefore, although both HPD and LPD groups demonstrated a significant reduction in symptoms for the interpersonal sensitivity index, the magnitude of the change was much larger in HPD participants than in LPD participants, accounting for the significant interaction.

As illustrated in Figure 2, the magnitude of change from pre- to post-training is larger for HPD participants as compared to LPD participants for both the hostility and interpersonal sensitivity indices. Most notable is that the HPD participants moved into the normal range from pre- to post-training (40-60). Also, although LPD participant psychological symptom scores were within normal range pre- and post-participation in Soldier 360, they also showed a significant improvement in psychological distress symptoms following Soldier 360° participation.

Figure 2. Effects of Soldier 360° training on SCL-90-R T-scores for the interpersonal sensitivity and hostility indices



Orange indicates individuals with high psychological distress (HPD) and light blue indicates individuals with low psychological distress (LPD). Navy blue indicates all participants.

Full ANOVA tables showing sum of squares, degrees of freedom, mean sum of squares, F statistics and p -values for main effects and interactions are presented in the **Appendix F**.

In summary, the hypothesis that Soldier 360° will lead to reduced symptoms of psychopathology is supported. For a majority of the symptom indices measured by the SCL-90-R the effect size of the reduction was small to moderate. This may be partly accounted for by the fact that LPD participants had relatively few symptoms at both pre- and post-training. The hypothesis that HPD participants would demonstrate a greater magnitude of change was supported for the hostility and interpersonal sensitivity indices, but not other indices, including the Global Severity Index. Participation in Soldier 360° appears to equally reduce overall psychological distress across all participants, whether classified at intake as exhibiting relatively high or low psychological distress.

EFFECTS OF SOLDIER 360° ON INTERFERENCE OF PAIN ON ACTIVITY, MOOD, STRESS AND SLEEP

The following sections describe the results of the analyses conducted on items related to the experience of pain on activity, mood, stress and sleep on both pre- and post-questionnaires. Pre- and post-training differences are shown first for all participants followed by HPD and LPD groups.

Of the 219 participants who answered the question on whether they were experiencing physical pain on both pre- and post-questionnaires 90 (41.1%) reported experiencing pain at pre-training and 83 (37.9%) reported experiencing pain post-training. This change was not statistically significant according to McNemar’s test ($\chi^2=1.25$; $df=1$; $p=0.262$). These results indicate that the proportion of participants reporting pain (and completed this question on both pre- and post-questionnaires) did not change by the end of training.

There were 312 participants who answered the question on whether they were experiencing physical pain at pre-training; 139 indicated in the affirmative. The following analyses were limited to these 139 participants.

Pre- versus Post-Differences, All Participants

Sample sizes, means, *SDs*, *F*-statistics, and effect sizes for interference ratings of pain on general functioning, mood, stress, and sleep are shown in Table 4. Mixed model ANOVA analyses revealed no significant main effect for program participation for any of the four pain interference variables. This indicates that there were no significant pre-post differences in interference scores across the cohort as a whole for ratings of interference of pain on general function, mood, stress and sleep.

Table 4. Pre/post differences in pain interference ratings, all participants

Interference of Pain on...	<i>n</i>	All Participants		Session Main Effect ¹	
		Pre Mean (<i>SD</i>)	Post Mean (<i>SD</i>)	<i>F</i>	Effect Size η^2_p
<i>General Functioning</i>	104	3.58 (2.22)	3.54 (2.74)	2.86	0.001
<i>Mood</i>	101	3.03 (2.39)	2.59 (2.49)	2.73	0.030
<i>Stress</i>	103	2.56 (2.23)	2.51 (2.42)	0.07	0.001
<i>Sleep</i>	103	3.13 (2.82)	2.61 (2.94)	2.77	0.030

* $p < 0.05$, ** $p < 0.001$

¹Indicates *F*-test for the pre- versus post- difference across all participants.

Pre- versus Post- Differences by HPD and LPD Groups

Sample sizes, means, *SDs*, *F*-statistics, and effect sizes for interference ratings of pain on general functioning, mood, stress and sleep stratified by HPD and LPD groups are shown in Table 5. Across all four pain measures, HPD participants reported significantly more interference of pain with activity, mood, stress and sleep than LPD participants (see **Appendix E** Table 2 for between-groups ANOVA results of HPD versus LPD). This finding is expected and indicates that participants with higher psychological distress also experienced pain as having a

greater impact on a number of life-functioning outcomes. More surprisingly, however, is that no statistically significant interactions between high and low distress groups following participation in the Soldier 360° program were found.

Table 5. Pre-post differences in pain interference ratings, HPD and LPD participants

Interference of Pain on...	HPD			LPD			Session x Psychological Distress Interaction ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	F	Effect Size η^2_p
<i>General Functioning</i>	39	4.32 (2.01)	4.77 (2.21)	64	3.08 (2.19)	2.75 (2.77)	2.86	0.030
<i>Mood</i>	38	4.42 (2.32)	4.32 (2.53)	62	2.21 (2.03)	1.48 (1.73)	1.52	0.020
<i>Stress</i>	39	3.87 (2.17)	3.90 (2.64)	63	1.78 (1.90)	1.62 (1.81)	0.14	0.001
<i>Sleep</i>	39	4.77 (2.79)	4.15 (3.08)	63	2.05 (2.28)	1.69 (2.44)	0.20	0.002

*p<0.05, **p<0.001; HPD=High Psychological Distress, LPD=Low Psychological Distress

¹Indicates F-test for whether the pre-post difference differed between HPD and LPD participants

Full ANOVA tables are presented in the **Appendix G**.

In summary, the hypothesis that Soldier 360° reduces self-reported interference of pain with general functioning, mood, stress, and sleep could not be confirmed by the data. Even among HPD participants who reported significantly more interference associated with pain at program intake, there was no conclusive change in interference associated with pain by the end of training.

EFFECTS OF SOLDIER 360° ON SATISFACTION WITH SLEEP, PROBLEMS ASSOCIATED WITH SLEEP, AND SLEEP HABITS

The following sections describe the results of the analyses conducted on items related to the satisfaction with sleep, problems associated with sleep, and sleep habits on both pre- and post-questionnaires. Pre- and post-training differences are shown first for all participants followed by HPD and LPD groups.

Importance of Sleep

At intake, 433 participants responded to the question about how important sleep is to happiness. Of these participants, 11 (2.5%), 123 (28.4%), and 299 (69%) reported sleep was “not important,” “important” and “extremely important,” respectively. After the course, only 382 individuals responded to this question on the post questionnaire. Of these respondents, three (0.79%), 109 (28.5%), and 270 (70.7%), reported sleep was “not important,” “important” and “extremely important,” respectively. The change in the distribution of these values, based on Bowker’s test, was not significant ($\chi^2=5.55$; $df=3$; $p=0.1358$).

Satisfaction with Sleep

Pre- versus Post- Differences, All Participants

Sample sizes, means, SDs, *F*-statistics, and effect sizes for ratings of satisfaction with falling asleep, staying asleep and waking up at the desired time across all participants are shown in Table 6. A critical α of 0.05 was used for all *F*-tests. Mixed model ANOVA revealed a significant main effect of session for satisfaction with falling asleep ($F(1,376)=76.33, p<.001$), staying asleep ($F(1,376)=40.57, p<.001$) and waking up ($F(1,373)=19.81, p<.001$) indicating that mean satisfaction scores significantly improved from pre- to post-training across the entire cohort. The magnitude of the differences based on the effect size was moderate for falling asleep, and small to moderate for staying asleep and waking up (Table 6).

Table 6. Pre/post differences in satisfaction with falling asleep, staying asleep and waking up at the desired time, all participants

Satisfaction with...	All Participants			Session Main Effect ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>F</i>	Effect Size η^2_p
Falling Asleep	386	0.58 (2.07)	1.31 (1.72)	76.33**	0.17
Staying Asleep	386	0.49 (2.06)	1.13 (1.82)	40.57**	0.10
Waking Up at Desired Time	386	1.33 (1.75)	1.63 (1.61)	19.81**	0.05

* = $p<0.05$, **= $P<0.001$

¹Indicates *F*-test for the pre- versus post-difference across all participants

Pre- versus Post-Differences by HPD and LPD Groups

Sample sizes, means, SDs, *F*-statistics and effect sizes for ratings of satisfaction with falling asleep, staying asleep and waking up at the desired time stratified by HPD and LPD groups are shown in Table 7. A critical α of 0.05 was used to assess for statistical significance for all *F*-tests.

HPD participants had significantly lower satisfaction scores for all three variables (see **Appendix E** Table 3 for between-groups ANOVA results of HPD versus LPD). Significant interactions between psychological distress and session were found for satisfaction with falling asleep ($F(1,376)=8.37, p=0.004$) and waking up at the desired time ($F(1,373)=5.87, p=0.0159$). The effects sizes (Table 7) indicate that the interaction effect accounted for only a small proportion of the variation in scores.

Table 7. Pre-post differences in satisfaction with falling asleep, staying asleep and waking up at the desired time, HPD and LPD participants

Satisfaction with...	HPD			LPD			Session x Psychological Distress Interaction ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>F</i>	Effect Size η^2_p
Falling Asleep	92	-0.89 (2.00)	0.29 (1.97)	286	1.03 (1.88)	1.62 (1.50)	8.37*	0.020
Staying Asleep	92	-0.73 (2.05)	0.08 (2.04)	286	0.88 (1.90)	1.45 (1.61)	1.25	0.003

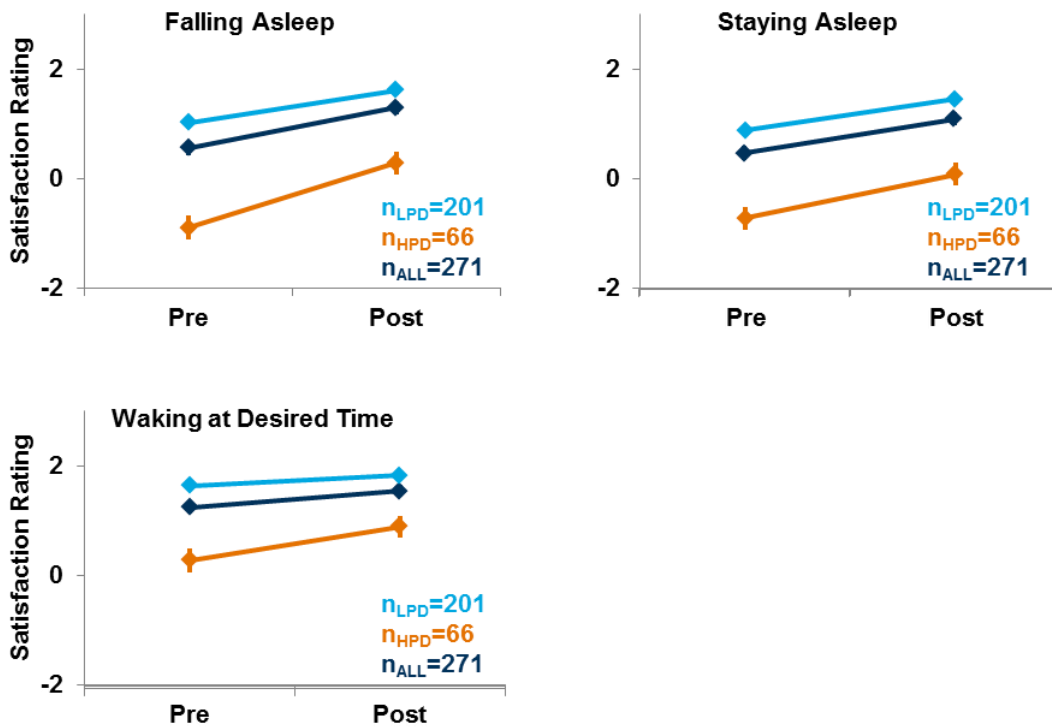
Satisfaction with...	HPD			LPD			Session x Psychological Distress Interaction ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	F	Effect Size η^2_p
Waking Up at Desired Time	92	0.30 (2.05)	0.92 (1.95)	286	1.64 (1.51)	1.83 (1.43)	5.87*	0.020

*= $p < 0.05$, **= $p < 0.001$; HPD=High Psychological Distress, LPD=Low Psychological Distress

¹Indicates F-test for whether the pre-post difference differed between HPD and LPD participants

Follow-up simple effects tests on satisfaction scores for falling asleep revealed significant differences between pre- and post-training in both psychological health status groups (HPD: $F(1,91)=31.43, p < .001$; LPD: $F(1,285)=39.61, p < .001$). However, the effect size η^2_p for the pre-post effect among HPD participants was 0.26 while it was 0.12 for LPD participants indicating a much larger change in satisfaction scores between pre- and post-training among high psychological distress participants compared to low psychological distress participants. This effect is further illustrated in Figure 3 (note that the size of the effect of the change between pre- and post-training was larger in HPD participants compared to LPD participants).

Figure 3. Effects of Soldier 360° training on satisfaction with falling asleep, staying asleep and waking at the desired time



Orange indicates individuals with high psychological distress (HPD) and light blue indicates individuals with low psychological distress (LPD). Navy blue indicates all participants.

Simple effects tests on the satisfaction scores for waking up revealed a significant difference between pre- and post-training in both groups (HPD: $F(1,90)=8.38, p<.05$; LPD: $F(1,283)=5.84, p<.05$). The effect size η^2_p for the pre/post effect among HPD participants was 0.09 versus 0.02 for LPD participants, indicating a larger pre- to post-training change among HPD participants. Although the effect size was larger in HPD participants, both groups demonstrated a relatively small change from pre- to post-, as illustrated in Figure 3.

These results support the hypothesis that Soldier 360° can lead to improved self-reported satisfaction with falling asleep, staying asleep, and waking up at the desired time. The impact appears to be greatest for self-reported satisfaction with falling asleep and among HPD participants.

Full ANOVA tables are presented in the **Appendix H**.

Sleep Problems Interfering with Daily Functioning, Quality of Life and Distress

Pre versus Post Differences, All Participants

Sample sizes, means, SDs, *F*-statistics, and effect sizes for ratings of sleep problems affecting daily functioning, quality of life and causing distress across all participants are shown in Table 8. A critical α of 0.05 was used to determine statistical significance for all *F*-tests.

Mixed model ANOVA revealed a significant main effect of program participation for daily function ($F(1,376)=43.19, p<.001$) and distress ($F(1,375)=11.65, p<.001$) indicating the cohort as a whole reported less sleep problems affecting daily functioning and distress at the end of Soldier 360° training than at the beginning of training. The effect sizes indicate that the magnitude of the difference was small to moderate for both measures. There was no significant change reported for sleep problems affecting quality of life.

Table 8. Pre-post differences in ratings of problems with daily function, quality of life and distress due to sleep problems, all participants

Sleep problems affecting:	<i>n</i>	All Participants		Session Main Effect ¹	
		Pre Mean (SD)	Post Mean (SD)	<i>F</i>	Effect Size η^2_p
Functioning	385	3.75 (2.87)	2.62 (2.64)	43.19**	0.10
Quality of Life	385	2.72 (2.68)	2.46 (2.76)	2.56	0.01
Distress	385	2.75 (2.90)	2.40 (2.76)	11.65**	0.03

* = $p < 0.05$, ** = $p < 0.001$

¹Indicates *F*-test for the pre- versus post- difference across all participants

Pre- versus Post- Differences by HPD and LPD Groups

Sample sizes, means, SDs, *F*-statistics and effect sizes for ratings of sleep problems affecting daily functioning, quality of life and distress stratified by HPD and LPD groups are shown in Table 9. A critical α of 0.05 was used to determine statistical significance for all *F*-tests.

HPD participants reported worse sleep-associated problems for all three variables (see **Appendix E** Table 4 for between groups ANOVA results of HPD versus LPD). Mixed model

ANOVA revealed a significant interaction between session and psychological distress for distress ($F(1,375)=5.91, p=0.0155$), indicating that the pre-post change differed between HPD and LPD groups. The magnitude of the interaction as indicated by the effect size was small, however.

Table 9. Pre-post differences in ratings of problems with daily function, quality of life and distress due to sleep problems, HPD and LPD participants

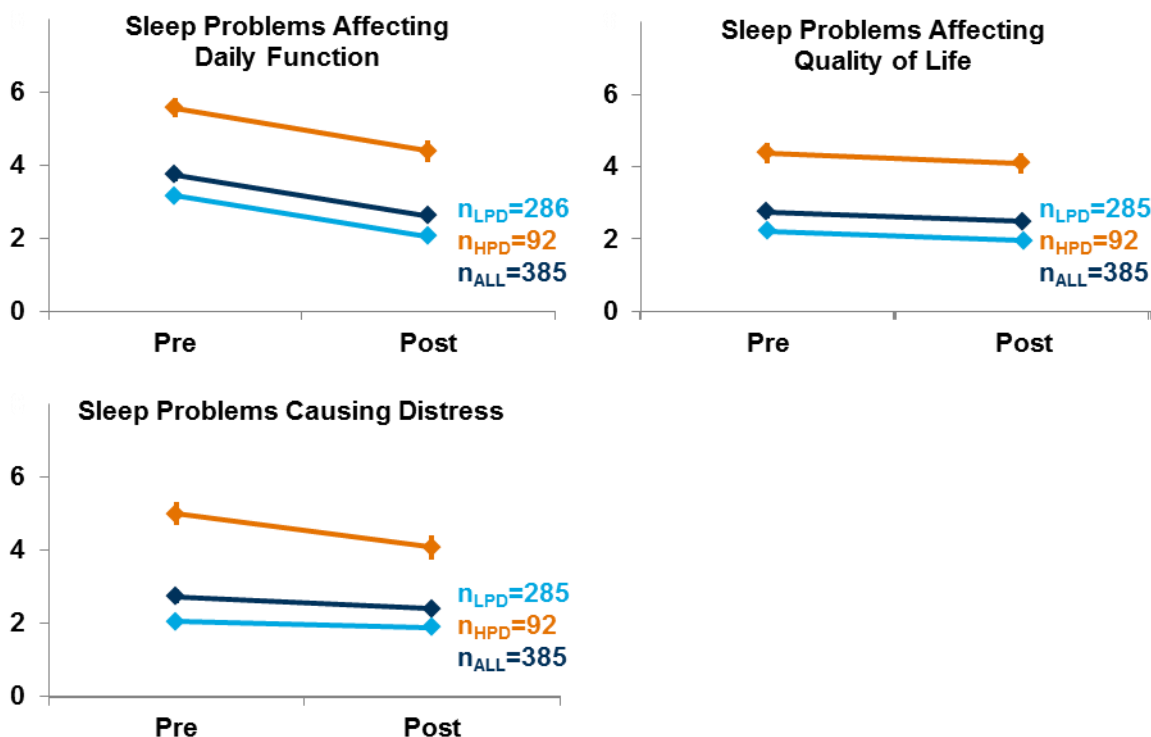
Sleep problems affecting:	HPD			LPD			Session x Psychological Distress Interaction ¹	
	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	<i>n</i>	Pre Mean (SD)	Post Mean (SD)	F	Effect Size η^2_p
Functioning	92	5.59 (2.65)	4.40 (2.79)	286	3.18 (2.68)	2.06 (2.34)	0.04	<0.001
Quality of Life	92	4.36 (2.80)	4.08 (2.79)	286	2.22 (2.42)	1.96 (2.57)	0.01	<0.001
Distress	92	5.01 (3.08)	4.08 (3.16)	286	2.05 (2.45)	1.90 (2.40)	5.91*	0.020

*= $p<0.05$, **= $p<0.001$; HPD=High Psychological Distress, LPD=Low Psychological Distress

¹Indicates F-test for whether the pre- post difference differed between HPD and LPD participants

Simple effects tests using one-way repeated measures ANOVAs on the sleep problems causing distress ratings for HPD and LPD participants revealed a significant pre-post difference in HPD participants ($F(1,91)=6.97, p<.05$) but no difference among LPD participants ($F(1,284)=1.23, p=0.268$). As illustrated in Figure 4, there was a significant pre- to post-training change in HPD participants, but no significant change in LPD participants. Note also that LPD participants had relatively little distress related to sleep problems pre-training.

Figure 4. Effects of Soldier 360° training on problems with daily function, quality of life and distress due to sleep problems



Orange indicates individuals with high psychological distress (HPD) and light blue indicates individuals with low psychological distress (LPD). Navy blue indicates all participants.

These results support the hypothesis that Soldier 360° training can improve the reported degree to which sleep problems affect daily function and cause distress. However, the magnitude of the change, regardless of psychological distress, is relatively small.

Full ANOVA tables are presented in the **Appendix H**.

Sleep Habits

Table 10 shows the frequency of “Yes” responses to the 10 items related to sleep habits. McNemar’s χ^2 -tests revealed that, at the conclusion of Soldier 360°, significantly more participants, regardless of whether in the low or high psychological distress group, reported avoiding nicotine and alcohol before bedtime, engaging in a wind-down routine, sleeping the same length each night, waking up at the same time each morning, and avoiding using their bedroom for non-sleep/sex activities.

Table 10. Pre-post changes in sleep habits, all participants

Sleep Habit	n	Pre		Post		McNemar’s Test	
		Yes	%	Yes	%	χ^2	P
Avoid caffeine w/in 6 hrs before	413	279	67.6	280	67.8	0.01	0.920
Avoid nicotine w/in 1 hr before	394	250	63.5	267	67.8	4.31	0.040*

		Pre		Post		McNemar's Test	
Have alcohol w/in 2 hrs before [†]	409	84	20.5	61	14.9	6.37	0.010**
Strenuous exercise w/in 2 hrs before [†]	417	27	6.5	27	6.5	1.00	1.000
Wind-down routine w/in 1 hour before	416	190	45.7	233	56.0	16.40	<0.001***
Comfortable environment	418	346	82.8	359	85.9	2.19	0.140
Sleep same length each night	415	236	56.9	283	68.2	16.60	<0.001***
Wake up same time each morning	413	330	79.9	355	86.0	7.72	0.010**
Move to room if unable to sleep	407	105	25.8	110	27.0	0.18	0.660
Use bed for non-sleep/non-sex activity [†]	413	234	56.7	212	51.3	4.84	0.030*

[†] Reverse-scored items; * Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

Symptoms and Impacts to Functioning after a Poor Night's Sleep

Table 11 provides a summary of the distribution of participants reporting fatigue, difficulty functioning, mood problems and physical symptoms after a poor night's sleep. No statistical tests were conducted for these items because there was no question assessing whether participants had a poor night's sleep. Since the total number of participants who had a poor night's sleep is unknown, assessing symptoms related to a poor night's sleep was not possible.

Table 11. Pre-post distributions of fatigue, difficulty functioning, mood problems and physical symptoms after a poor night's sleep, across all participants

After poor night's sleep...	Pre			Post		
	n	Yes	%	n	Yes	%
Daytime Fatigue	471	453	96.2	418	403	96.4
Difficulty Functioning	470	362	77.0	418	318	76.1
Mood Problems	470	415	88.3	418	360	86.1
Physical Symptoms	472	304	64.4	418	265	63.4

Note: No statistical tests were conducted since proportions could not be calculated for each symptom/problem.

EFFECTS OF SOLDIER 360° ON WELL-BEING AS ASSESSED BY ATTITUDES TOWARD AND SATISFACTION WITH HEALTH, RELATIONSHIPS AND QUALITY OF LIFE

The following sections report the changes in importance rating of the 15 domains from pre- to post-training, followed by changes in satisfaction across the 15 domains of health, relationships and quality of life. Pre- and post-training differences are shown first for all participants followed by HPD and LPD groups.

Importance Ratings

Bowker’s test was applied first to determine whether the change in the distribution of importance ratings for each domain between pre- and post- training was significant. The tests revealed a significant increase in participants’ ratings of importance from pre- to post-training for the following domains: command support, family diet, family relationships, health, marriage, psychological health, occupation, quality of life, social support and spirituality. No significant differences between HPD participants and LPD participants were observed. The distribution of respondents’ ratings of importance for all 15 domains of health, relationships and quality of life as well as the Bowker’s test and associated *p*-values are provided in **Appendix I**.

Changes in Satisfaction across 15 Domains of Well-Being

Pre- versus Post-Differences, All Participants

Sample sizes, means, *SDs*, *F*-statistics, and effect sizes for satisfaction ratings for all participants across the 15 domains of health, relationships and quality of life are shown in Table 12. Mixed model ANOVAs revealed main effects of session for all domains except for command support. Examination of the means in Table 12 indicate the main effects reflect significantly higher satisfaction scores by the end of Soldier 360° training across these domains. However, examination of the effect sizes (η^2_p) indicates that the magnitude of these changes is generally small. The fitness domain had the largest effect size (.14).

Table 12. Pre-post differences in satisfaction ratings of well-being as assessed by 15 domains of health, relationships and quality of life - all participants

Satisfaction With:	<i>n</i>	All Participants		Session Main Effect ¹	
		Pre Mean (<i>SD</i>)	Post Mean (<i>SD</i>)	<i>F</i>	Effect Size η^2_p
Children	233	2.22 (1.38)	2.37 (1.09)	3.06	0.013
Family Relationships	359	1.64 (1.47)	1.89 (1.21)	11.38**	0.031
Marriage	271	1.57 (1.76)	1.80 (1.76)	17.67**	0.063
Command Support	374	0.95 (1.77)	0.93 (1.67)	0.65	0.002
Financial Situation	381	1.33 (1.50)	1.54 (1.32)	15.32**	0.039
Occupation	378	1.08 (1.80)	1.34 (1.53)	2.50	0.007
Psychological Health	384	1.42 (1.45)	1.78 (1.30)	24.95**	0.062
Quality of Life	372	1.48 (1.50)	1.85 (1.22)	22.64**	0.058
Sexual Relationships	361	1.15 (1.90)	1.61 (1.64)	30.92**	0.080
Social Support	373	1.86 (1.25)	2.04 (1.19)	9.48*	0.025
Spirituality	363	1.42 (1.44)	1.74 (1.09)	19.16**	0.051
Diet	375	0.98 (1.57)	1.40 (1.28)	21.18**	0.055
Family Diet	329	1.29 (1.49)	1.53 (1.29)	5.82*	0.018
Fitness	372	0.78 (1.70)	1.42 (1.37)	61.20**	0.144
General Health	378	1.28 (1.47)	1.65 (1.21)	22.50**	0.058

* = *p* < 0.05, ** = *p* < 0.001

¹Indicates *F*-test for the pre- versus post-difference across all participants

Pre- versus Post-Differences by HPD and LPD Groups

Sample sizes, means, SDs, F-statistics, and effect sizes for satisfaction ratings stratified by HPD and LPD groups across the 15 domains of health, relationships and quality of life are shown in Table 13. HPD participants reported lower satisfaction across all domains (see **Appendix E** Table 5 for between-groups ANOVA results of HPD versus LPD). A significant interaction between psychological distress and session was found for the domains of marriage ($F(1,265)=6.848, p=0.009$) and financial satisfaction ($F(1,371)=6.763, p=0.010$). The effect sizes indicate that the interactions accounted for a very small proportion of the overall variation in scores.

Table 13. Pre-post differences in satisfaction ratings of well-being as assessed by 15 domains of health, relationships and quality of life - HPD and LPD participants

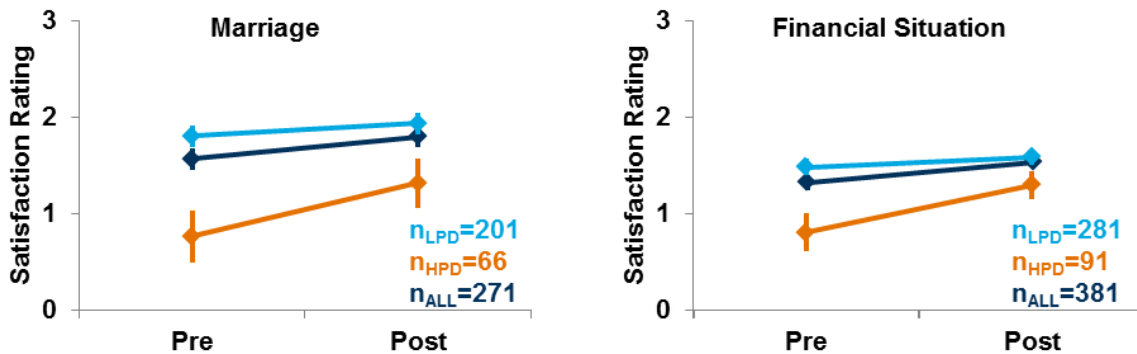
Satisfaction With:	HPD			LPD			Session x Psychological Distress Interaction ¹	
	n	Pre Mean (SD)	Post Mean (SD)	N	Pre Mean (SD)	Post Mean (SD)	F	Effect Size η^2_p
Children	61	1.84 (1.82)	2.00 (1.37)	168	2.35 (1.17)	2.49 (0.95)	0.01	<0.001
Family Relationships	79	1.20 (1.84)	1.53 (1.38)	274	1.77 (1.30)	1.99 (1.15)	0.48	0.001
Marriage	66	0.77 (2.20)	1.32 (2.12)	201	1.81 (1.52)	1.94 (1.61)	6.85*	0.025
Command Support	91	0.40 (2.09)	0.26 (1.89)	275	1.16 (1.59)	1.15 (1.53)	0.45	0.001
Financial Situation	91	0.81 (1.93)	1.30 (1.46)	282	1.49 (1.30)	1.59 (1.28)	6.76*	0.018
Occupation	91	0.60 (2.04)	0.59 (1.89)	280	1.23 (1.69)	1.56 (1.32)	2.85	0.008
Psychological Health	91	0.40 (1.82)	0.91 (1.71)	285	1.75 (1.11)	2.05 (1.01)	1.62	0.004
Quality of Life	91	0.80 (1.83)	1.27 (1.59)	273	1.72 (1.27)	2.02 (1.01)	1.18	0.003
Sexual Relationships	85	0.26 (2.12)	0.85 (1.97)	271	1.41 (1.74)	1.83 (1.46)	0.89	0.003
Social Support	87	1.32 (1.66)	1.68 (1.51)	279	2.03 (1.05)	2.14 (1.06)	2.61	0.007
Spirituality	85	1.04 (1.82)	1.48 (1.32)	271	1.53 (1.27)	1.80 (1.00)	1.24	0.003
Diet	89	0.42 (1.77)	0.85 (1.62)	278	1.15 (1.44)	1.55 (1.11)	0.06	<0.001
Family Diet	78	0.99 (1.74)	1.13 (1.57)	244	1.37 (1.39)	1.65 (1.17)	0.60	0.002
Fitness	90	-0.14 (1.83)	0.64 (1.78)	275	1.10 (1.53)	1.67 (1.10)	1.60	0.004
General Health	91	0.45 (1.80)	0.79 (1.65)	279	1.57 (1.20)	1.92 (0.87)	0.001	<0.001

*= $p<0.05$, **= $p<0.001$; HPD=High Psychological Distress, LPD=Low Psychological Distress
¹Indicates F-test for whether the pre-post difference differed between HPD and LPD participants

Simple effects tests of the change in marriage satisfaction by psychological distress group revealed a significant difference between pre- and post-training in both groups (HPD: $F(1,65)=9.94, p<.01$; LPD: $F(1,200)=3.10, p<.01$). However, the partial η^2_p for the pre-post effect among HPD participants was much larger (0.13) than the partial η^2_p for LPD participants

(0.015). This indicates that the magnitude of the increase in satisfaction with marriage was greater in HPD participants than in LPD participants, as illustrated in Figure 5.

Figure 5. Effects of Soldier 360° training on satisfaction with marriage and financial situation



Orange indicates individuals with high psychological distress (HPD) and light blue indicates individuals with low psychological distress (LPD). Navy blue indicates all participants.

Simple effects tests on the change in satisfaction with financial situation by psychological distress group revealed a significant difference between pre- and post-training among HPD participants ($F(1,90)=8.23, p<.01$). However, there was no significant difference between pre- and post-training in LPD participants ($F(1,281)=2.29, p=.131$). These results, illustrated in Figure 5, indicate that HPD, but not LPD, participants demonstrate a significant change in satisfaction with their financial situation by the end of Soldier 360° training. Full ANOVA tables are presented in **Appendix J**.

In summary, the hypothesis that Soldier 360° training can improve well-being as measured by the reported satisfaction with the 15 domains of health, relationships, and quality of life was supported. The magnitude of the improvement in satisfaction was small to moderate across all domains. The hypothesis that Soldier 360° would have a greater impact on participants with high psychological distress was supported for the domains of marriage and financial situation. For all other domains, although HPD participants reported less satisfaction, the change between pre- and post-training was relatively similar between HPD and LPD groups.

Discussion

Overall, Soldier 360° appears to lead to short-term improvements in symptoms of psychopathology, sleep and well-being as measured by attitudes towards and satisfaction with health, relationships and quality of life. All participants appeared to demonstrate improvements in most of the measures, with certain important exceptions, regardless of the level of psychological distress reported when entering the program. This is, in general, contrary to the hypothesis that those who entered the program with high psychological distress would benefit more from the program than those with low psychological distress. In general, individuals who entered the program with low psychological distress or other measurable symptoms of psychopathology (as assessed by the SCL-90-R) were relatively satisfied with their sleep, as well as the 15 domains of health, relationships, and quality of life. However, even despite sub-threshold levels of distress, they appeared to significantly improve in these areas with the same magnitude as HPD participants across most of the measures analyzed. Finally, contrary to

hypothesis, the program appears to have no effect on the impact of pain on general functioning, stress, mood or sleep.

CONCLUSIONS

Objective 1: Effects of Soldier 360° on Symptoms of Psychopathology

The severity of psychopathological symptoms, as measured by the SCL-90-R, demonstrated a statistically significant decrease after participation in Soldier 360° across all domains except for anxiety. While effect sizes ranged from small to moderate depending on the SCL-90-R index, across all participants the Global Severity Index, a measure of overall psychological distress, was reduced with relatively large-effect size between pre- and post-training. The Global Severity Index is the most commonly used and most reliable index from the SCL-90-R. Hence, the fact that this measure showed a relatively large effect provides encouraging evidence that Soldier 360° could have a beneficial impact on soldier's psychological health symptoms, regardless of the degree of psychological distress with which they enter the program.

Contrary to the hypothesis that participants with higher psychological distress would benefit more from participation in Soldier 360°, results indicated that HPD and LPD participants improved relatively equally on most SCL-90-R indices following participation in the program (although not surprisingly HPD participants scored overall higher on all SCL-90-R indices). An interesting exception to this finding, however, is that participants with high psychological distress showed marked improvements in the hostility and interpersonal-sensitivity indices of the SCL-90-R, both of which are externalizing behaviors often connected with violence and suicide. The hostility index includes symptoms such as "frequent arguments" and "uncontrollable temper outbursts," and the interpersonal sensitivity index reflects symptoms related to feelings of personal inadequacy and inferiority (Derogatis, Lipman, & Covi, 1973). Interestingly, combat exposure, which is more frequent and severe (based on the greater frequency of blast exposures) among HPD participants, is a strong predictor of externalizing behaviors (Wright, 2012). The fact that LPD participants demonstrate relatively similar training-related differences on all other indices (which are mostly internalizing) but are markedly different with respect to externalizing behaviors could be linked in some way to differences in combat exposure. More research will be required to investigate this relationship, but it raises the possibility that Soldier 360° could hold promise for reducing adverse behavioral outcomes (violence, suicide) that have been associated with combat related stress. A longitudinal study that compares soldiers with and without Soldier 360° training after undergoing moderate to severe combat exposure would be required to further understand findings. Moreover, future studies should consider administering additional validated measures of hostility, interpersonal sensitivity, and other externalizing behaviors, since issues have been raised regarding the stability of the SCL-90-R instrument's factor structure (Paap, 2012).

Objective 2: Effects of Soldier 360° on Pain Interference with General Activity, Mood, Stress and Sleep

Participants' self-reports on the degree to which pain interfered with general activity, mood, stress and sleep did not change significantly after participation in the course. Although these results do not conclusively indicate that Soldier 360° training modules related to pain are ineffective, it does suggest the need to more closely examine this program component for potential modification. There were limitations involving the pain assessment questions, such as

the lack of valid and reliable measures for rating interference of pain, which limited the ability to draw conclusions about the effects of the program on pain (see limitations on page 37).

Objective 3: Effects of Soldier 360° on Satisfaction with Sleep, Problems Associated with Sleep, and Sleep Habits

Soldier 360° contributes to improvements in satisfaction and reduction in problems associated with sleep. Following participation in Soldier 360°, all participants reported significantly greater satisfaction with falling asleep, staying asleep, and waking up at the desired time. Among these, falling asleep had the largest effect size. All participants also reported that sleep problems were less likely to be distressing and interfere with daily functioning, and quality of life.

The magnitude of the improvements was greater for HPD participants with respect to satisfaction related to falling asleep and waking up when needed. This might be explained by the fact that LPD participants were generally satisfied with sleep and had fewer sleep problems when they entered the program than participants with higher psychological distress. In other words, this finding might be explained as lower psychological distress participants had less to gain in the area of sleep quality from the program. Unfortunately no questions were asked on the survey about the nature and severity of sleep problems so this hypothesis could not be accurately assessed (see limitations below). Another noteworthy finding is that all participants demonstrated improvements in sleep habits by the end of training. Namely, fewer participants reported that they used nicotine or alcohol before bed, fewer used their bed for non-sleep/non-sex activity, more reported that they developed a “wind-down routine,” more slept the same length each night, and more woke up at the same time each morning.

On the whole, these findings indicate that the Soldier 360° program may hold promise for improving sleep habits as well as quality of sleep regardless of whether participants experience high or low psychological distress. A limit to this finding, however, is that sleep assessment questions were not based on valid and reliable measures. To validate the conclusion that the Soldier 360° program improves sleep habits and sleep quality, it is suggested that follow-up analyses using validated measures for assessing sleep habits and quality be conducted.

Objective 4: Effects of Soldier 360° on Well-Being as Assessed by Attitudes Toward and Satisfaction with Health, Relationships and Quality of Life

Well-being, as assessed by attitudes toward and satisfaction with health, relationships and quality of life was shown to improve by the end of training. Specifically, all participants showed significant improvements in their perceptions of importance for command support, family diet, family relationships, health, marriage, psychological health, occupation, quality of life, social support and spirituality. Further, examination of satisfaction scores revealed that across all participants statistically significant improvements in satisfaction were observed for diet, fitness, health, marriage, psychological health, quality of life and sexual relationships. Relatively higher effect sizes (i.e., greater change in satisfaction) were associated with psychological health, sexual relationships, and fitness. A limit to these findings, however, is that valid and reliable measures were not used to assess these domains of well-being. It is suggested, therefore, that the program consider incorporating valid well-being measures to validate and strengthen current study findings.

Interestingly, we found that high and low psychological distress participants differed in their level of change regarding satisfaction with marriage and financial matters. Low psychological distress participants showed only weak changes in satisfaction with marriage and financial matters,

compared to participants reporting high levels of psychological distress. This is largely explained by the fact that as a group low distress participants indicated satisfaction in these domains at program entry, whereas high distress participants were on the whole dissatisfied at entry (and therefore had more to gain from the program). The improvement in satisfaction with marriage and financial matters is noteworthy since these domains have been shown to be closely associated with risk for suicide ideation (Kline, 2011).

Finally, despite the improvements in satisfaction for the aforementioned domains, by the end of training, high psychological distress participants still had relatively higher dissatisfaction for all domains compared to low psychological distress participants. This result suggests the need for additional action for high psychological participants, perhaps even over and above what is currently provided by Soldier 360°.

LIMITATIONS AND RECOMMENDATIONS

There were several issues that limit the scope and interpretability of this evaluation. First, this study lacks a true control group (a group of individuals administered the same measures over the same time frame but who did not attend Soldier 360°) and so it is inconclusive that the effects are related to the training provided by Soldier 360°. One could argue that simply being away from combat and other life stressors for two weeks could lead to similar outcomes. A long-term, randomized controlled trial that compares NCOs with and without Soldier 360° training before and after similar combat exposure, stressors or other traumatic experiences would be required to more definitively attribute effectiveness to Soldier 360°. Case-control or cohort study designs could be conducted if a randomized controlled trial is not feasible.

Second, the surveys were only administered at intake and at the conclusion of the program. Therefore improvements in the various measures reflect the time period spanning the program but not long-term. It is unknown whether the positive effects observed in this study would sustain over a longer period of time. This certainly merits further examination, and hence, steps should be taken to formally assess intermediate as well as long-term outcomes. In general, a more objective assessment of the impact of Soldier 360° will be best achieved with continuous follow-up and evaluation. Ideally, studies should be designed to collect health and operational outcomes of Soldier 360° program participants across several months or years in order to measure differences in resilience, fitness and well-being across exposure to various events (e.g., stressors in garrison, deployment, combat exposure), while controlling for extraneous and confounding variables (e.g., gender, age, years of service, previous diagnoses, family history). At minimum the program should consider collecting outcomes data during the sustainment sessions that occur during the six-month period following training.

A third limitation is that the PCL-M, BDI and BAI instruments were only administered at intake. These screens should be administered at the conclusion of the course (as well as long-term follow-ups) to evaluate whether symptoms related to these conditions are reduced by participation in Soldier 360°. Future analyses should also consider using the continuous form of these measures since dichotomization can lead to loss of information as well as lead to spurious results.

Fourth, several survey questions had important limitations as follows:

- The sleep, pain, and attitudes/satisfaction instruments do not appear to be validated, psychometrically-tested measures. Well-validated measures are readily available and should be administered for future evaluations.

- With respect to pain, the pre- and post- questionnaires did not assess severity of pain, which could vary substantially among those indicating any pain. Since variation in the severity of pain is not adequately accounted for, assessing the impact of pain on mood, stress and sleep was substantially limited. This limitation may have contributed to the absence of conclusive findings for the impact of Soldier 360° program on reducing pain.
- The pre- and post-questionnaires asked whether sleep problems impact daily functioning, impact quality of life or cause distress. However, the questionnaires neither assessed whether a participant was having sleep problems nor the type of problem they were experiencing. For example, insomnia, nightmares, apnea and several other types of sleep problems could have wide-ranging impact on daily functioning, quality of life and distress. Similarly, the questionnaires asked whether a poor night's sleep was associated with daytime fatigue, impaired functioning, mood problems, physical symptoms or "none." However there was no question on whether a participant was experiencing a poor night's sleep. Those that choose "none" could be either participants who do not experience poor night's sleep or they could be participants who experience a poor night's sleep but not any of the listed problems. In general, it is not clear whether the sleep assessment questions are standardized questions whose validity and reliability have been empirically tested.
- With regards to the 15 health, relationships and quality of life domain questions, the majority of the participants indicated at intake that most of the items were "important" or "extremely important." For the domains that demonstrated a pre-post difference, the change was primarily a result of responses from participants considering a domain "extremely important" at the end of training versus "important" at intake. It is not clear how meaningful this change is. Moreover, these questions appear to be modeled after the Quality of Life Inventory (QOLI), but it is not clear that adapting these domains to the QOLI format is valid. Efforts should be made to ensure validity of the questions and whether the current scale (a three-point Likert scale) is sufficient to capture the variation in attitudes towards the various domains.

Finally, the response rate for answering the same question on both questionnaires was approximately 60 percent across most questions. Efforts should be made to increase this response rate. Efforts should also be made to assess the characteristics of non-responders and how the results would change had they been included. When all surveys are taken at the same time, there are a substantial number of questions and survey fatigue could be a factor. As such, considerations should be made to determine whether the number of surveys or questions could be shortened. Not only would this help improve response rates but could be advantageous for repeated, longitudinal assessments.

FUTURE DIRECTIONS

Based on the results of this evaluation the program managers of Soldier 360° should consider (a) assessing the long-term impact of the program, (b) obtaining additional evidence that it is useful for NCOs who enter the program relatively symptom-free and satisfied with their health, relationships, and quality of life, and (c) determining whether the training can buffer the impact of exposure to combat or other stressors. In future assessments, improved survey instruments and methods, and establishing the efficacy of the program using controlled trials should also be considered.

The Soldier 360° program may benefit a wider audience than its current target population of NCOs. If the program intends to broaden its implementation and roll-out to other populations

within the Army and DoD, future efforts could leverage the results of this study in the design of a fidelity assessment framework to evaluate and monitor the consistency and accuracy of program implementation so that similarly positive results can be achieved.

Glossary of Acronyms and Key Terms

ANOVA	Analysis of Variance
BAI	Beck's Anxiety Inventory
BDI	Beck's Depression Inventory
BMEDDACC	Bavaria Medical Department Activity
DCoE	Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury
DoD	Department of Defense
MOS	Military Occupational Specialty
NCO	non-commissioned officer
PCL-M	Posttraumatic stress disorder checklist
PHI	protected health information
PII	personally identifiable information
PSDI	Positive Symptom Distress Index
PST	Positive Symptom-Total
PTSD	posttraumatic stress disorder
QOLI	Quality of Life Inventory
SCL-90-R	Symptom Checklist-90-Revised
SD	standard deviation
TFF	Total Force Fitness
TMA	Tricare Management Activity

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Appendices

- Appendix A: Sample Program Schedule
- Appendix B: Data Handling Procedures
 - B1: Data de-identification and transfer
 - B2: Complete list of data elements
- Appendix C: Data Cleaning and Preparation
- Appendix D: Study Variables
- Appendix E: Between-subjects main effects of HPD versus LPD
- Appendix F: SCL-90-R ANOVA Table
- Appendix G: Pain Assessment ANOVA Table
- Appendix H: Sleep Assessment ANOVA Table
- Appendix I: Changes in Attitudes across 15 Domains between Pre- and Post-Questionnaires
- Appendix J: Satisfaction with Health, Relationships and Quality of Life Domains ANOVA Table

APPENDIX A: SAMPLE PROGRAM SCHEDULE

Week 1 January 24-28, 2011

	Monday, January 24	Tuesday, January 25	Wednesday, January 26	Thursday, January 27	Friday, January 28
0700	Group Formation (0730 – Graf Burger King) Transport Check-in	Morning Exercise	Morning Exercise	Morning Exercise	Morning Exercise
0730		Breakfast / Personal Hygiene 0845 – Staff/Facilitator Coordination	Breakfast / Personal Hygiene 0845 – Staff/Facilitator Coordination	Breakfast / Personal Hygiene 0845 – Staff/Facilitator Coordination	Breakfast / Personal Hygiene 0845 – Staff/Facilitator Coordination
0900		~Intake Completion~ Journal Topic - Morning Humor and Health	~Joke of the day~	~Joke of the day~	~Joke of the day~
1000	Course introduction / Orientation / Ground Rules / Rotation Sessions <i>Name, From, Goals, Something about yourself</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>
1100	Breathing Stress / Stress Response <i>(video, remembered wellness, take a 360)</i>	Injuries and Injury Prevention (LTC Anderson)	Spirituality (CH Copeland)	Suicide Prevention (V. Duffy) (1030-1100) Resiliency (Viet Nam POW)	Nutrition II /or/ Poetry
1130		Yoga	Yoga	Yoga	Yoga
1230	Lunch / UMUC Session	Lunch / UMUC Session	Lunch / UMUC Session	Lunch / UMUC Session	Lunch / UMUC Session
1330	Biofeedback (Heather) Mindfulness Relaxation Response <i>(take a 360)</i>	Journal Topic - Afternoon Physical Training I ~SME Q&A~ (LTC Anderson) <i>(Cardio, profile PT, training planning)</i>	Journal Topic - Afternoon Communication I (Madeline)	Journal Topic - Afternoon Pain / Pain Management Acupuncture	Journal Topic - Afternoon <i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B) -- ??</i>
1400	Journaling Anger / Anger Management	<i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	<i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	<i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	Weekend assignments Plan review
1500	PTSD Sleep	Physical Training II ~SME Q&A~ (LTC Anderson)	Communication II (Madeline)	Mindful Sex and Relationships	AAR Transportation to Graf
1630	Personal Time	Personal Time	Personal Time	Personal Time	
1700	Dinner	Dinner	Dinner	Dinner	

Soldier 360° Evaluation Final Report

1830	<p><u>Evening Session:</u> Hypnosis</p> <p>Staff / Facilitator daily review / prep next day sessions / coordination/ observations-issues, concerns</p>	<p><u>Evening Session:</u> Mindful Wine Tasting Discussion: Alcohol and Alcohol Management</p> <p>Staff / Facilitator daily review / prep next day sessions / coordination/ observations-issues, concerns</p>	<p><u>Evening Session:</u> Discussion: Art Therapy - Amanda Salisbury "Draw your Journey – past and present relationships" how these have brought you to where you are today?</p> <p>Staff / Facilitator daily review / prep next day sessions / coordination/ observations-issues, concerns</p>	<p><u>Evening Session:</u> Storytelling (journal assignment)</p> <p>Staff / Facilitator daily review / prep next day sessions / coordination/ observations-issues, concerns</p>	
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Week 2 January 31 – February 4, 2011 – Building 134 – Rose Barracks

	Monday, January 31	Tuesday, February 1 ~Financial Counselor~	Wednesday, February 2 ~Financial Counselor~	Thursday, February 3	Friday, February 4
0800	Yoga (Soldier Instructor)	Yoga (Soldier Instructor)	Yoga (Soldier Instructor)	Yoga (Soldier Instructor)	Yoga (Soldier Instructor)
0900	Introduction – Couples Weekend review/ outcomes Soldier / Staff Presentations: • Stress/Stress Management • Mindfulness	Journal Topic Soldier / Staff Presentations: • Communication – Couples • Communication – Parent-Child	Journal Topic Soldier / Staff Presentations: • PTSD	Journal Topic Soldier / Staff Presentations: • Suicide Prevention Domestic Violence	<i>Shield Exercise</i>
1000	<i>Communication – Family / Child</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	<i>Small Group Sessions (Group A and B)/ Physical Training (Group C and D)</i>	
1100	<i>Couples Communication</i>	Soldier / Staff Presentations: • Communication – Supervisor / Leader • Humor and Health	Soldier / Staff Presentations: • Anger / Anger management • Alcohol / Alcohol Management	Soldier / Staff Presentations: • Resiliency ('What does a traumatized person look like?')	Course Evaluations
1130	Journal Topic	Martial Arts (?)		Martial Arts (?)	
1200	Lunch	Lunch	Lunch	Lunch	Lunch
1300	Soldier / Staff Presentations: • Biofeedback	Journal Topic <i>Art Therapy</i> <i>'Why am I here? What is my</i>	Soldier / Staff Presentations:	Journal Topic Soldier / Staff Presentations: • Pain / Pain	

Soldier 360° Evaluation Final Report

	• Relaxation Response	<i>purpose?</i>	• Injury Prevention	Management	
1400	• Sleep • Journaling <i>Hypnosis</i>	<i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	• Physical Training <i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	<i>Small Group Sessions (Group C and D)/ Physical Training (Group A and B)</i>	1400 – Tower View Inn Graduation / Command Reception
1500	<i>Soldier Speaker –</i>	<u>Soldier / Staff Presentations:</u> • Spirituality - “Spirituality as a fundamental attitude that imbues your whole life.”	<u>Soldier/ Staff Presentations:</u> • Nutrition <i>Psychology of Consumption</i>	<u>Soldier / Staff Presentations:</u> • Sex and Relationships	
	1530 – Warrior Yoga - <u>Soldier Instructor</u>	1530 - Warrior Yoga - <u>Soldier Instructor</u>	1530 – Warrior Yoga - <u>Soldier Instructor</u>	1530 – Warrior Yoga - <u>Soldier Instructor</u>	Instructor AAR discussion
1630	Journal Topic AAR	AAR	AAR	AAR – <i>Homework: Shield</i>	

APPENDIX B: DATA HANDLING PROCEDURES

Appendix B1: Data de-identification and transfer

Due to the retrospective nature of this study, all analyses were based on a de-identified subset of existing Soldier 360° program data from the Grafenwoehr military community in Germany. No active recruitment of study participants was conducted.

All data from the Soldier 360° program are maintained on a secure server at the Bavaria Medical Department Activity (BMEDDAC). The server is located within a limited-access facility hosted by the U.S. Army Medical Department. For this evaluation study, a subset of this data from seven implementations of the Soldier 360° program (between March 2010 and December 2011) was extracted and de-identified for analyses. The process of de-identification was conducted by members of the Grafenwoehr military community to exclude personally identifiable information (PII) or protected health information (PHI), and entered into an Excel spreadsheet indexed by dummy identification numbers which linked responses from the same participant. The de-identified spreadsheet was then transferred to DCoE via encrypted channels and analyzed by DCoE staff or contracted business associates of the TRICARE Management Activity (TMA).

The de-identification and data discretization procedures conducted by BMEDDAC removed the following PII as well as PHI from the dataset prior to data transfer:

- Name
- Postal address information, other than town or city, state, zip codes, and their equivalent geocodes, except for the initial three digits of a zip code, if according to the current publicly available data from the Bureau of the Census: (1) The geographic unit formed by combining all zip codes with the same three initial digits contains more than 20,000 people; and (2) The initial three digits of a zip code for all such geographic units containing 20,000 or fewer people is changed to 000
- All elements of dates (except year) for dates directly related to an individual
- Telephone numbers
- Fax numbers
- Electronic mail addresses
- Social security numbers
- Medical record numbers
- Health plan beneficiary numbers
- Account numbers
- Certificate or license numbers
- Vehicle identifiers and serial numbers, including license plate numbers
- Device identifiers and serial numbers
- Web Universal Resource Locators (URLs)
- Internet Protocol (IP) address numbers
- Biometric identifiers, including finger and voice prints
- Full-face photographic images or any comparable images

To ensure the privacy of participants, the following items extracted from BMEDDAC that correspond to potential sensitive demographic and military service variables were binned into discrete categories before data transfer to eliminate any risk for identifiable information.

Column	Field	Definition	Data Type / Format
N/A	UID	Unique Identifier for De-identification Purposes	Assigned by BMEDDAC
N/A*	Age Bin*	Age Bin of when subject participated in Soldier 360°	Discretized into ordinal categories for de-identification: < 20; 20-24; 25-29; 30-34; 35-39; >40
4*	Rank*	DOD Rank Designation (e.g., E5 / O3)	Combined to minimize identifiability: E5-E6 / E7-E8
8	GDR	Gender	M (Male) / F (Female)
9*	MOS*	Military Occupational Specialty - Primary	Combined by specialty to minimize identifiability: Infantry; Artillery; Other
26*	# DEPL*	Number of Deployments	Combined into categories to minimize identifiability: Never, 1-3, 4-6, 7-9, 10 or more
27*	#BLAST*	Number of Blast Exposures	Combined into categories to minimize identifiability: Never, 1-2, 3-4, 5 or more
29*	#SOLDIERS*	Number of Soldiers Personally Supervised	Combined into categories to minimize identifiability: None, 1-10, 11-20, 21-30, 31-40, 41-50, 51 or more
30*	# CIV*	Number of Civilians Personally Supervised	Combined into categories to minimize identifiability: None, 1-5, 6-10, 11-15, 16-20, 21 or more
32*	MaritalStatus	Marital Status	Combined into categories to minimize identifiability: S (Single/Never Married); M (Currently Married); OTHER (Separated, Divorced, Widowed, Unknown)
37*	LengthMarr*	Length of Marriage (years)	Integer
45*	EdLevel*	Highest Level of Education Completed	Combined into categories to minimize identifiability: High School; Some College; Bachelor's Degree; Advanced Degree

Use of data received from BMEDDAC was strictly limited to the analysis plan contained within the TMA protocol, which was approved Internal Review Board (IRB) exempt by an exemption determination officer. All received data and back-up copies are stored in limited access facilities on encrypted and password protected computers. All copies will promptly be destroyed upon completion of this study. Any findings or conclusions drawn from analysis of these data will not be shared with any party, institute, or agency other than the program evaluation team and DCoE without prior consent or instruction from BMEDDAC.

Appendix B2: Complete List of Data Elements

In addition to the demographic and military service variables listed in Appendix B1, the following data elements were extracted by BMEDDAC personnel, indexed by the UID and transferred for analyses.

Column	Field	Definition	Data Type / Format
47	OccHappINTL	Importance of Current Occ to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
48	OccSatINTL	Satisfaction with Current Occupation - Initial	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
54	QualLifeINTL	Importance of Overall Quality of Life - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
55	QualLifeSatINTL	Satisfaction with Quality of Life - Initial	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
59	FitHappINTL	Importance of Fitness to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
60	FitSatINTL	Satisfaction with Current Fitness - Initial	Indicate + / - signs
62	HealthHappINTL	Importance of Health to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
63	HealthSatINTL	Satisfaction with Current Health - Initial	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
68	DietHappINTL	Importance of Diet to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
69	DietSatINTL	Satisfaction with Current Diet - Initial	Indicate + / - signs
71	FamDietHappINTL	Importance of Family's Diet to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
72	FamDietSatINTL	Satisfaction with Family's Diet - Initial	Indicate + / - signs
74	ExpPainINTL	Experiencing Physical Pain - Initial	Y (Yes) / N (No); VA-DOD Pain Assess Tool

Soldier 360° Evaluation Final Report

Column	Field	Definition	Data Type / Format
75	GenActPainINTL	Pain Interfered with General Activity - Initial	Closest Full Number; VA-DOD Pain Assmnt
76	MoodPainINTL	Pain Affected Mood - Initial	Closest Full Number; VA-DOD Pain Assmnt
77	StressPainINTL	Level of Stress Related to Pain - Initial	Closest Full Number; VA-DOD Pain Assmnt
78	SleepPainINTL	Pain Affected Sleep - Initial	Closest Full Number; VA-DOD Pain Assmnt
79	SleepHappINTL	Importance of Sleep to Happiness - Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
80	SleepFallSat INTL	Satisfaction with Ability to Fall Asleep - Initial	Indicate + / - signs
81	SleepStaySat INTL	Satisfaction with Ability to Stay Asleep - Initial	Indicate + / - signs
82	WakeSat INTL	Satisfaction with Ability to Wake Up - Initial	Indicate + / - signs
84	Sleep-Function INTL	Sleep Problems Interfere with Functioning - Initial	Closest Full Number
85	SleepQOL INTL	Sleep Problems Impair Quality of Life - Initial	Closest Full Number
86	SleepDistress INTL	Worried/Distressed over Sleep Problems - Initial	Closest Full Number
87	DayFatigue-a.1-INTL	Poor Night's Sleep - Have Daytime Fatigue: Tired	Y (Yes) / N (No) -- ['No' if not marked]
88	DayFatigue-a.2-INTL	Poor Night's Sleep - Have Daytime Fatigue: Exhausted	Y (Yes) / N (No) -- ['No' if not marked]
89	DayFatigue-a.3-INTL	Poor Night's Sleep - Have Daytime Fatigue: Washed Out	Y (Yes) / N (No) -- ['No' if not marked]
90	DayFatigue-a.4-INTL	Poor Night's Sleep - Have Daytime Fatigue: Sleepy	Y (Yes) / N (No) -- ['No' if not marked]
91	DiffFunc - b.1 - INTL	Poor Sleep - Difficult Functioning - Work/Daily Chores	Y (Yes) / N (No) -- ['No' if not marked]
92	DiffFunc - b.2 - INTL	Poor Sleep - Difficult Functioning - Concentration	Y (Yes) / N (No) -- ['No' if not marked]
93	DiffFunc - b.3 - INTL	Poor Sleep - Difficult Functioning - Memory	Y (Yes) / N (No) -- ['No' if not marked]
94	MoodProb - c.1 - INTL	Poor Sleep - Mood Problems - Irritable	Y (Yes) / N (No) -- ['No' if not marked]
95	MoodProb - c.2 - INTL	Poor Sleep - Mood Problems - Tense	Y (Yes) / N (No) -- ['No' if not marked]

Column	Field	Definition	Data Type / Format
96	MoodProb - c.3 - INTL	Poor Sleep - Mood Problems - Nervous	Y (Yes) / N (No) -- ['No' if not marked]
97	MoodProb - c.4 - INTL	Poor Sleep - Mood Problems - Groggy	Y (Yes) / N (No) -- ['No' if not marked]
98	MoodProb - c.5 - INTL	Poor Sleep - Mood Problems - Depressed	Y (Yes) / N (No) -- ['No' if not marked]
99	MoodProb - c.6 - INTL	Poor Sleep - Mood Problems - Anxious	Y (Yes) / N (No) -- ['No' if not marked]
100	MoodProb - c.7 - INTL	Poor Sleep - Mood Problems - Grouch	Y (Yes) / N (No) -- ['No' if not marked]
101	MoodProb - c.8 - INTL	Poor Sleep - Mood Problems - Hostile	Y (Yes) / N (No) -- ['No' if not marked]
102	MoodProb - c.9 - INTL	Poor Sleep - Mood Problems - Angry	Y (Yes) / N (No) -- ['No' if not marked]
103	MoodProb -c.10- INTL	Poor Sleep - Mood Problems - Confused	Y (Yes) / N (No) -- ['No' if not marked]
104	PhySymp - d.1 - INTL	Poor Sleep - Physical Symptoms - Muscle Aches/Pain	Y (Yes) / N (No) -- ['No' if not marked]
105	PhySymp - d.2 - INTL	Poor Sleep - Physical Symptoms - Light-Headed	Y (Yes) / N (No) -- ['No' if not marked]
106	PhySymp - d.3 - INTL	Poor Sleep - Physical Symptoms - Headache	Y (Yes) / N (No) -- ['No' if not marked]
107	PhySymp - d.4 - INTL	Poor Sleep - Physical Symptoms - Nausea	Y (Yes) / N (No) -- ['No' if not marked]
108	PhySymp - d.5 - INTL	Poor Sleep - Physical Symptoms - Heartburn	Y (Yes) / N (No) -- ['No' if not marked]
109	PhySymp - d.6 - INTL	Poor Sleep - Physical Symptoms - Muscle Tension	Y (Yes) / N (No) -- ['No' if not marked]
110	None - INTL	Poor Sleep - No Symptoms	Y (Yes) / N (No) -- ['No' if not marked]
111	Sleep - Caffeine-INTL	Avoid Caffeinne 6 Hours Before Sleep - Initial	Y (Yes) / N (No)
112	Sleep - Nicotine-INTL	Avoid Nicotine 1 Hours Before Sleep - Initial	Y (Yes) / N (No)
113	Sleep - Alcohol - INTL	Have Alcohol within 2 Hours Before Sleep - Initial	Y (Yes) / N (No)
114	Sleep-Exercise- INTL	Exercise Within 2 Hours Before Sleep - Initial	Y (Yes) / N (No)
115	Sleep-Unwind-INTL	Have an Unwind Routine Within 1 Hour of Sleep - Initial	Y (Yes) / N (No)

Soldier 360° Evaluation Final Report

Column	Field	Definition	Data Type / Format
116	Sleep-Naps - INTL	Take Naps Lasting Over 30 Minutes - Initial	Y (Yes) / N (No)
117	Sleep-Enviorn-INTL	Is Bedroom / Sleep Enviornment Comfortable - Initial	Y (Yes) / N (No)
118	Sleep-Hours-INTL	Sleep Same Length of Time Each Night - Initial	Y (Yes) / N (No)
119	Sleep-WakeTime-INTL	Wake up at Regular Time - Initial	Y (Yes) / N (No)
120	Sleep-Unable-INTL	Unable to Sleep - Get Up After 15-20 Min - Initial	Y (Yes) / N (No)
121	Sleep-Bedroom-INTL	Bedroom Used for Other Activities Than Sleep/Sex-Initial	Y (Yes) / N (No)
122	PsychHealthHappINTL	Importance of Psychological Health to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
123	PsychHealthSatINTL	Satisfaction with Psychological Health - Initial	Indicate + / - signs
128	SexRelatnshpHappINTL	Importance of Sexual Relationships to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
129	SexRelatnshpSatINTL	Satisfaction with Sexual Relationships - Initial	Indicate + / - signs
131	FamilyRelatnshpHappINTL	Importance of Family of Origin Relationships to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
132	FamilyRelSatINTL	Satisfaction with Family Relationships - Initial	Indicate + / - signs
134	MarriageHappINTL	Importance of Marriage to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
135	MarriageSatINTL	Satisfaction with Marriage - Initial	Indicate + / - signs
137	ChildrenHappINTL	Importance of Relationship w/Children to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
138	ChildrenSatINTL	Satisfaction with Relationship w/Children - Initial	Indicate + / - signs
140	MarriageStress - INTL	Currently Experiencing Relationship Stressors - Initial	Y (Yes) / N (No)
141	ChildrenProbl - INTL	Concerns/Problems with Children - Initial	Y (Yes) / N (No)
142	SocialSupHapp - INTL	Importance of Social Support to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
143	SocialSupptSat - INTL	Satisfaction with Social Support - Initial	Indicate + / - signs
149	CmdSupptHapp - INTL	Importance of CMD Chain Support to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
150	CmdSupptSat - INTL	Satisfaction with Chain of Command Support - Initial	Indicate + / - signs

Column	Field	Definition	Data Type / Format
152	SpiritualityHapp - INTL	Importance of Spirituality to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
153	SpiritualitySat - INTL	Satisfaction with Spirituality - Initial	Indicate + / - signs
155	SpiritualCommunityINTL	Identify with a Spiritual Community - Initial	Y (Yes) / N (No)
156	FinancialProblemsINTL	Have Current Financial Problems - Initial	Y (Yes) / N (No)
157	NeedFinCounINTL	Need Financial Counseling or Assistance	Y (Yes) / N (No)
158	FinancialHapp - INTL	Importance of Social Support to Happiness-Initial	Closest value (0, 0.5, 1.0, 1.5, 2.0)
159	FinancialSat - INTL	Satisfaction with Social Support - Initial	Indicate + / - signs
175	PCL-M	PTSD Checklist - Military - Initial	Score
176	BAI - Initial	Beck's Anxiety Inventory - Initial	Score
177	BDI-II Initial	Beck's Depression Inventory-Revised Initial	Score
178	SCL-90 SOM Raw INTL	Symptom Checklist-90 Revised Somatization Scale Initial	Raw Score
179	SCL-90 SOM T-Score INTL	Symptom Checklist-90 Revised Somatization Scale Initial	T-Score
180	SCL-90 O-C Raw INTL	SCL-90 Revised Obsessive-Compulsive Scale Initial	Raw Score
181	SCL-90 O-C T-Score INTL	SCL-90 Revised Obsessive-Compulsive Scale Initial	T-Score
182	SCL-90 I-S Raw INTL	SCL-90 Revised Interpersonal Sensitivity Scale Initial	Raw Score
183	SCL-90 I-S T-Score INTL	SCL-90 Revised Interpersonal Sensitivity Scale Initial	T-Score
184	SCL-90 DEP Raw INTL	SCL-90 Revised Depression Scale Initial	Raw Score
185	SCL-90 DEP T-Score INTL	SCL-90 Revised Depression Scale Initial	T-Score
186	SCL-90 ANX Raw INTL	SCL-90 Revised Anxiety Scale Initial	Raw Score
187	SCL-90 ANX T-Score INTL	SCL-90 Revised Anxiety Scale Initial	T-Score
188	SCL-90 HOS Raw INTL	SCL-90 Revised Hostility Scale Initial	Raw Score
189	SCL-90 HOS T-Score INTL	SCL-90 Revised Hostility Scale Initial	T-Score
190	SCL-90 PHOB Raw INTL	SCL-90 Revised Phobic Anxiety Scale Initial	Raw Score
191	SCL-90 PHOB T-Score INTL	SCL-90 Revised Phobic Anxiety Scale Initial	T-Score
192	SCL-90 PAR Raw INTL	SCL-90 Revised Paranoid Ideation Scale Initial	Raw Score
193	SCL-90 PAR T-Score INTL	SCL-90 Revised Paranoid Ideation Scale Initial	T-Score
194	SCL-90 PSY Raw INTL	SCL-90 Revised Psychoticism Scale Initial	Raw Score
195	SCL-90 PSY T-Score INTL	SCL-90 Revised Psychoticism Scale Initial	T-Score
196	SCL-90 GSI Raw INTL	SCL-90 Revised Global Severity Index Initial	Raw Score
197	SCL-90 GSI T-Score INTL	SCL-90 Revised Global Severity Index Initial	T-Score

Soldier 360° Evaluation Final Report

Column	Field	Definition	Data Type / Format
198	SCL-90 PST Raw INTL	SCL-90 Revised Positive Symptom Total Initial	Raw Score
199	SCL-90 PST T-Score INTL	SCL-90 Revised Positive Symptom Total Initial	T-Score
200	SCL-90 PSDI Raw INTL	SCL-90 Revised Positive Symptom Distress Index Initial	Raw Score
201	SCL-90 PSDI T-Score INTL	SCL-90 Revised Positive Symptom Distress Index Initial	T-Score
338	OccHapp2Wk	Importance of Current Occ to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
339	OccSat2Wk	Satisfaction with Current Occupation - Two Week	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
344	QualLife2Wk	Importance of Overall Quality of Life - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
345	QualLifeSat2Wk	Satisfaction with Quality of Life - Two Week	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
347	FitHapp2Wk	Importance of Fitness to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0)
348	FitSat2Wk	Satisfaction with Current Fitness - Two Week	Indicate + / - signs
350	HealthHapp2Wk	Importance of Health to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0); Also asked in QOLI - Consistency Comparison
351	HealthSat2Wk	Satisfaction with Current Health - Two Week	Indicate + / - signs. Also asked in QOLI - Consistency Comparison
353	DietHapp2Wk	Importance of Diet to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0)
354	DietSat2Wk	Satisfaction with Current Diet - Two Week	Indicate + / - signs
356	FamDietHapp2Wk	Importance of Family's Diet to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0)
357	FamDietSat2Wk	Satisfaction with Family's Diet - Two Week	Indicate + / - signs
359	ExpPain2Wk	Experiencing Physical Pain - Two Week	Y (Yes) / N (No); VA-DOD Pain Assess Tool
360	GenActPain2Wk	Pain Interfered with General Activity - Two Week	Closest Full Number; VA-DOD Pain Assmnt

Column	Field	Definition	Data Type / Format
361	MoodPain2Wk	Pain Affected Mood - Two Week	Closest Full Number; VA-DOD Pain Assmnt
362	StressPain2Wk	Level of Stress Related to Pain -Two Week	Closest Full Number; VA-DOD Pain Assmnt
363	SleepPain2Wk	Pain Affected Sleep - Two Week	Closest Full Number; VA-DOD Pain Assmnt
364	SleepHapp2Wk	Importance of Sleep to Happiness - Two Week	Closest value (0, 0.5, 1.0, 1.5, 2.0)
365	SleepFallSat 2Wk	Satisfaction with Ability to Fall Asleep - Two Week	Indicate + / - signs
366	SleepStaySat 2Wk	Satisfaction with Ability to Stay Asleep - Two Week	Indicate + / - signs
367	WakeSat 2Wk	Satisfaction with Ability to Wake Up -Two Week	Indicate + / - signs
370	Sleep-Function2Wk	Sleep Problems Interfere with Functioning	Closest Full Number
371	SleepQOL 2Wk	Sleep Problems Impair Quality of Life	Closest Full Number
372	SleepDistress 2Wk	Worried/Distressed over Sleep Problems	Closest Full Number
373	DayFatigue-a.1-2Wk	Poor Night's Sleep - Have Daytime Fatigue: Tired	Y (Yes) / N (No) -- ['No' if not marked]
374	DayFatigue-a.2-2Wk	Poor Night's Sleep - Have Daytime Fatigue: Exhausted	Y (Yes) / N (No) -- ['No' if not marked]
375	DayFatigue-a.3-2Wk	Poor Night's Sleep - Have Daytime Fatigue: Washed Out	Y (Yes) / N (No) -- ['No' if not marked]
376	DayFatigue-a.4-2Wk	Poor Night's Sleep - Have Daytime Fatigue: Sleepy	Y (Yes) / N (No) -- ['No' if not marked]
377	DiffFunc - b.1 - 2Wk	Poor Sleep - Difficult Functioning - Work/Daily Chores	Y (Yes) / N (No) -- ['No' if not marked]
378	DiffFunc - b.2 - 2Wk	Poor Sleep - Difficult Functioning - Concentration	Y (Yes) / N (No) -- ['No' if not marked]
379	DiffFunc - b.3 - 2Wk	Poor Sleep - Difficult Functioning - Memory	Y (Yes) / N (No) -- ['No' if not marked]
380	MoodProb - c.1 - 2Wk	Poor Sleep - Mood Problems - Irritable	Y (Yes) / N (No) -- ['No' if not marked]
381	MoodProb - c.2 - 2Wk	Poor Sleep - Mood Problems - Tense	Y (Yes) / N (No) -- ['No' if not marked]
382	MoodProb - c.3 - 2Wk	Poor Sleep - Mood Problems - Nervous	Y (Yes) / N (No) -- ['No' if not marked]

Soldier 360° Evaluation Final Report

Column	Field	Definition	Data Type / Format
383	MoodProb - c.4 - 2Wk	Poor Sleep - Mood Problems - Groggy	Y (Yes) / N (No) -- ['No' if not marked]
384	MoodProb - c.5 - 2Wk	Poor Sleep - Mood Problems - Depressed	Y (Yes) / N (No) -- ['No' if not marked]
385	MoodProb - c.6 - 2Wk	Poor Sleep - Mood Problems - Anxious	Y (Yes) / N (No) -- ['No' if not marked]
386	MoodProb - c.7 - 2Wk	Poor Sleep - Mood Problems - Grouch	Y (Yes) / N (No) -- ['No' if not marked]
387	MoodProb - c.8 - 2Wk	Poor Sleep - Mood Problems - Hostile	Y (Yes) / N (No) -- ['No' if not marked]
388	MoodProb - c.9 - 2Wk	Poor Sleep - Mood Problems - Angry	Y (Yes) / N (No) -- ['No' if not marked]
389	MoodProb -c.10- 2Wk	Poor Sleep - Mood Problems - Confused	Y (Yes) / N (No) -- ['No' if not marked]
390	PhySymp - d.1 - 2Wk	Poor Sleep - Physical Symptoms - Muscle Aches/Pain	Y (Yes) / N (No) -- ['No' if not marked]
391	PhySymp - d.2 - 2Wk	Poor Sleep - Physical Symptoms - Light-Headed	Y (Yes) / N (No) -- ['No' if not marked]
392	PhySymp - d.3 - 2Wk	Poor Sleep - Physical Symptoms - Headache	Y (Yes) / N (No) -- ['No' if not marked]
393	PhySymp - d.4 - 2Wk	Poor Sleep - Physical Symptoms - Nausea	Y (Yes) / N (No) -- ['No' if not marked]
394	PhySymp - d.5 - 2Wk	Poor Sleep - Physical Symptoms - Heartburn	Y (Yes) / N (No) -- ['No' if not marked]
395	PhySymp - d.6 - 2Wk	Poor Sleep - Physical Symptoms - Muscle Tension	Y (Yes) / N (No) -- ['No' if not marked]
396	None - 2Wk	Poor Sleep - No Symptoms	Y (Yes) / N (No) -- ['No' if not marked]
397	Sleep - Caffeine-2Wk	Avoid Caffeinne 6 Hours Before Sleep	Y (Yes) / N (No)
398	Sleep - Nicotine-2Wk	Avoid Nicotine 1 Hours Before Sleep	Y (Yes) / N (No)
399	Sleep - Alcohol - 2Wk	Have Alcohol within 2 Hours Before Sleep	Y (Yes) / N (No)
400	Sleep-Exercise- 2Wk	Exercise Within 2 Hours Before Sleep	Y (Yes) / N (No)
401	Sleep-Unwind-2Wk	Have an Unwind Routine Within 1 Hour of Sleep	Y (Yes) / N (No)
402	Sleep-Naps - 2Wk	Take Naps Lasting Over 30 Minutes	Y (Yes) / N (No)
403	Sleep-Enviorn-2Wk	Is Bedroom / Sleep Enviornment Comfortable	Y (Yes) / N (No)

Column	Field	Definition	Data Type / Format
404	Sleep-Hours-2Wk	Sleep Same Length of Time Each Night	Y (Yes) / N (No)
405	Sleep-WakeTime-2Wk	Wake up at Regular Time	Y (Yes) / N (No)
406	Sleep-Unable-2Wk	Unable to Sleep - Get Up After 15-20 Min	Y (Yes) / N (No)
407	Sleep-Bedroom-2Wk	Bedroom Used for Other Activities Than Sleep/Sex	Y (Yes) / N (No)
408	PsychHealthHapp2Wk	Importance of Psychological Health to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
409	PsychHealthSat2Wk	Satisfaction with Psychological Health	Indicate + / - signs
414	SexRelatnshpHapp2Wk	Importance of Sexual Relationships to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
415	SexRelatnshpSat2Wk	Satisfaction with Sexual Relationships	Indicate + / - signs
417	FamilyRelatnshpHapp2Wk	Importance of Family of Origin Relationships to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
418	FamilyRelSat2Wk	Satisfaction with Family Relationships	Indicate + / - signs
420	MarriageHapp2Wk	Importance of Marriage to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
421	MarriageSat2Wk	Satisfaction with Marriage	Indicate + / - signs
423	ChildrenHapp2Wk	Importance of Relationship w/Children to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
424	ChildrenSat2Wk	Satisfaction with Relationship w/Children	Indicate + / - signs
426	SocialSupHapp - 2Wk	Importance of Social Support to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
427	SocialSupptSat - 2Wk	Satisfaction with Social Support	Indicate + / - signs
429	CmdSupptHapp - 2Wk	Importance of CMD Chain Support to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
430	CmdSupptSat - 2Wk	Satisfaction with Chain of Command Support	Indicate + / - signs
432	SpiritualityHapp - 2Wk	Importance of Spirituality to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
433	SpiritualitySat - 2Wk	Satisfaction with Spirituality	Indicate + / - signs
435	FinancialHapp - 2Wk	Importance of Social Support to Happiness	Closest value (0, 0.5, 1.0, 1.5, 2.0)
436	FinancialSat - 2Wk	Satisfaction with Social Support	Indicate + / - signs
438	SCL-90 SOM Raw 2Wk	Symptom Checklist-90 Revised Somatization Scale	Raw Score
439	SCL-90 SOM T-Score 2Wk	Symptom Checklist-90 Revised Somatization Scale	T-Score

Column	Field	Definition	Data Type / Format
440	SCL-90 O-C Raw 2Wk	SCL-90 Revised Obsessive-Compulsive Scale	Raw Score
441	SCL-90 O-C T-Score 2Wk	SCL-90 Revised Obsessive-Compulsive Scale	T-Score
442	SCL-90 I-S Raw 2Wk	SCL-90 Revised Interpersonal Sensitivity Scale	Raw Score
443	SCL-90 I-S T-Score 2Wk	SCL-90 Revised Interpersonal Sensitivity Scale	T-Score
444	SCL-90 DEP Raw 2Wk	SCL-90 Revised Depression Scale	Raw Score
445	SCL-90 DEP T-Score 2Wk	SCL-90 Revised Depression Scale	T-Score
446	SCL-90 ANX Raw 2Wk	SCL-90 Revised Anxiety Scale	Raw Score
447	SCL-90 ANX T-Score 2Wk	SCL-90 Revised Anxiety Scale	T-Score
448	SCL-90 HOS Raw 2Wk	SCL-90 Revised Hostility Scale	Raw Score
449	SCL-90 HOS T-Score 2Wk	SCL-90 Revised Hostility Scale	T-Score
450	SCL-90 PHOB Raw 2Wk	SCL-90 Revised Phobic Anxiety Scale	Raw Score
451	SCL-90 PHOB T-Score2Wk	SCL-90 Revised Phobic Anxiety Scale	T-Score
452	SCL-90 PAR Raw 2Wk	SCL-90 Revised Paranoid Ideation Scale	Raw Score
453	SCL-90 PAR T-Score 2Wk	SCL-90 Revised Paranoid Ideation Scale	T-Score
454	SCL-90 PSY Raw 2Wk	SCL-90 Revised Psychoticism Scale	Raw Score
455	SCL-90 PSY T-Score 2Wk	SCL-90 Revised Psychoticism Scale	T-Score
456	SCL-90 GSI Raw 2Wk	SCL-90 Revised Global Severity Index	Raw Score
457	SCL-90 GSI T-Score 2Wk	SCL-90 Revised Global Severity Index	T-Score
458	SCL-90 PST Raw 2Wk	SCL-90 Revised Positive Symptom Total	Raw Score
459	SCL-90 PST T-Score2Wk	SCL-90 Revised Positive Symptom Total	T-Score
460	SCL-90 PSDI Raw 2Wk	SCL-90 Revised Positive Symptom Distress Index	Raw Score
461	SCL-90 PSDI T-Score 2Wk	SCL-90 Revised Positive Symptom Distress Index	T-Score

Note: All data column, field, and definition were obtained from the data dictionary provided by the BMEDDAC at the Grafenwoehr Military Community in Germany

APPENDIX C: DATA CLEANING AND PREPARATION

Two ids – 425 and 428 – were de-duplicated. For the following variables, 'LF' responses and responses above 2 or below -2, were converted to invalid/missing:

- ChildrenHappINTL
- CmdSupptHapp___INTL
- DietHappINTL
- FamDietHappINTL
- FamilyRelatnshpHappINTL
- FinancialHapp___INTL
- FitHappINTL
- HealthHappINTL
- MarriageHappINTL
- OccHappINTL
- PsychHealthHappINTL
- SexRelatnshpHappINTL
- SleepHappINTL
- SocialSupHapp___INTL
- SpiritualityHapp___INTL
- QualLifeINTL
- FinancialSat___INTL
- WakeSat_INTL
- ChildrenHapp2Wk
- CmdSupptHapp___2Wk
- DietHapp2Wk
- FamDietHapp2Wk
- FamilyRelatnshpHapp2Wk
- FinancialHapp___2Wk
- FitHapp2Wk
- HealthHapp2Wk
- MarriageHapp2Wk
- OccHapp2Wk
- PsychHealthHapp2Wk
- SexRelatnshpHapp2Wk
- SleepHapp2Wk
- SocialSupHapp___2Wk
- SpiritualityHapp___2Wk
- QualLife2Wk

Non-numeric entries were removed from the following variables:

- SCL_90_ANX_Raw_2Wk
- SCL_90_DEP_Raw_2Wk
- SCL_90_GSI_Raw_2Wk
- SCL_90_HOS_Raw_2Wk
- SCL_90_I_S_Raw_2Wk
- SCL_90_O_C_Raw_2Wk
- SCL_90_PAR_Raw_2Wk
- SCL_90_PHOB_Raw_2Wk
- SCL_90_PSDI_Raw_2Wk
- SCL_90_PST_Raw_2Wk
- SCL_90_PSY_Raw_2Wk
- SleepHappINTL
- SleepQOL_INTL
- Sleep_Function
- SleepDistress

From all SCL-90-R T-score variables, values that were coded as <40 and 60+ were converted to invalid/missing. Also, values coded as <30 or 80+ were changed to invalid/missing since they extend beyond the measurement scale for the SCL-90-R.

One service member indicated “Sometimes” for the question, “Are you experiencing pain?” This answer was changed to “Yes” in order to dichotomize responses.

For the sleep question, “After a poor night’s sleep, which of the following do you tend to experience the next day?,” derived variables were created for fatigue, mood problems, and physical symptoms by assigning “Yes” if they answered yes to any corresponding individual descriptor. Individual descriptors are as follows:

- Daytime fatigue: tired, exhausted, washed-out, sleepy
- Difficulty functioning: performance impaired work/daily chores, difficulty concentrating, memory problems
- Mood problems: irritable, tense, nervous, groggy, depressed, anxious, grouchy, hostile, angry, confused
- Physical symptoms: muscle aches/pain, light-headed, headache, nausea, heartburn, muscle tension

APPENDIX D: STUDY VARIABLES

List of demographic and military service characteristics

Characteristic	Measurement
Demographic Characteristics	
Gender	Binary field: Male/Female
Age	Six categories: < 20, 20–24, 25–29, 30–34, 35–39, >40
Marital Status	Three categories: Single , Married, or Other
Highest Level of Education Completed	Four categories: High School, Some College, Bachelor’s Degree, Advanced Degree
Military Service Characteristics	
DOD Rank Designation / Pay Grade (e.g., E5 / O3)	Five categories: <E4, E5/ E6, E7/E8, GS, O and above
Military Occupational Specialty (MOS)	Three categories: Infantry, Field Artillery, All Other
Number of Deployments	Five categories: Never, 1-3, 4-6, 7-9, 10 or more
Number of Blast Exposures	Four categories: Never, 1-2, 3-4, 5 or more

Measures used to define the psychological health status of study participants

Instrument	Measurement
Posttraumatic stress disorder checklist (PCL-M)	17-item self-report 5-point Likert Scale for symptoms of PTSD
Beck’s Depression Inventory (BDI)	21-item multiple choice self-report inventory of symptoms of depression
Beck’s Anxiety Inventory (BAI)	21-item multiple choice self-report inventory of symptoms of anxiety

Items for symptoms of psychopathology, pain assessment and sleep assessment along with associated measurement

Item	Measurement
Symptoms of Psychopathology	

Item	Measurement
<p>SCL-90-R: Symptom indices related to nine dimensions of psychopathology:</p> <ul style="list-style-type: none"> • Anxiety • Depression • Hostility • Interpersonal sensitivity • Obsessive-compulsive behavior • Paranoia • Phobic anxiety • Psychoticism • Somatization 	<p>Each symptom was scored on a five-point scale (from 0 to 4) based on the level of distress related to the symptom, where “0” = “Not at all” and “4” = “Extremely”</p> <p>A respondent’s raw score is calculated for each domain based on a weighted sum of scores from all questions for that domain.</p> <p>For this evaluation, raw scores were converted to and analyzed as T-scores. T-scores are calculated by comparing the respondent’s scores to non-patient scores that are compiled into norm tables included in the SCL-90-R manual.</p> <p>A T-score of 50 is equivalent to the normal population, and a T-score between 40 and 60 represents the normal range.</p>
<p>SCL-90-R: Three global indices:</p> <ul style="list-style-type: none"> • Global Severity Index (GSI) • Positive Symptom Distress Index (PSDI) • Positive Symptom-Total (PST) 	<p>Each is scored on five-point scale (from 0 to 4) based on the level of distress related to the symptom, where “0” = “Not at all” and “4” = “Extremely.” GSI is a measure of a respondent’s overall psychiatric distress. PSDI is designed to measure the intensity of these symptoms. PST measures the number of self-reported symptoms for a respondent.</p>
<i>Pain Assessment Items</i>	
<p>“Are you experiencing pain?”</p>	<p>Binary “Yes/No” response mode</p>
<p>Degree to which pain interferes with:</p> <ul style="list-style-type: none"> • General activity • Mood • Level of stress • Sleep 	<p>Scored on a 11-point scale (from 0 to 10) where “0” = “Does not interfere” and “10” = “Completely interferes”</p>
<i>Sleep Assessment Items</i>	
<p>Importance of sleep</p>	<p>Scored on a three-point scale (from 0 to 2), where “0” = “Not important,” “1” = “Important,” and “2” = “Extremely important”</p>
<p>Satisfaction with:</p> <ul style="list-style-type: none"> • Ability to fall asleep • Ability to stay asleep • Ability to wake up when needed 	<p>Scored on a six-point scale (from -3 to 3), where “-3” = “Very dissatisfied,” “-2” = “Somewhat dissatisfied,” and “-1” = “A little dissatisfied.” The positive side of the scale mirrored the negative side where “1” = “A little satisfied,” “2” = “Somewhat satisfied,” and “3” = “Very satisfied.”</p>
<p>Degree to which sleep problems:</p> <ul style="list-style-type: none"> • Interfere with functioning • Affect quality of life • Cause distress 	<p>Scored on a 11-point scale (from 0 to 10) where “0” = “Not at all,” “1-3”=a little, “4-6”=somewhat, “7-9”=much and “10” = “Very much interfering”</p>

Item	Measurement
<p>Ten sleep habits:</p> <ul style="list-style-type: none"> • Avoid caffeine w/in 6 hours of sleep • Avoid nicotine w/in 1 hour of sleep • Have alcohol w/in 2 hours* • Engage in strenuous exercise w/in 2 hours* • Have a wind-down routine • Sleep in a comfortable environment • Sleep the same amount of time each night • Wake up at the same time each morning • Move to another room if unable to sleep • Use the bedroom for non-sleep or non-sex activities* <p>* Reverse-scored items</p>	<p>Binary “Yes/No” response mode asking whether the participant engaged in each sleep habit (or activity)</p>
<p>Symptoms of a poor night’s sleep related to:</p> <ul style="list-style-type: none"> • Daytime fatigue • Difficulty functioning • Mood problems • Physical symptoms 	<p>Scored based on the number of positive responses to symptoms in each individual case. Specifically, participants were asked to check all symptoms that applied to them.</p> <ul style="list-style-type: none"> • For daytime fatigue: “Tired,” “Exhausted,” “Washed-out” and “Sleepy” • For difficulty functioning: “Performance impaired work/daily chores,” “Difficulty concentrating” and “Memory Problems” • For mood problems: “Irritable,” “Tense,” “Nervous,” “Groggy,” “Depressed,” “Anxious,” “Grouchy,” “Hostile,” “Angry” and “Confused” • For physical symptoms: “Muscle aches/pain,” “Light Headed,” “Headache,” “Nausea,” “Heartburn” and “Muscle tension”

Items for assessing attitudes toward and satisfaction with the 15 domains of health, relationships and quality of life

Item	Measurement
<p>Domains of Health, Relationships and Quality of Life:</p> <ul style="list-style-type: none"> • Children • Command • Support • Diet • Family Diet • Family Relationships • Financial • Fitness • Health • Marriage • Psychological Health • Occupation • Quality of Life • Sexual Relationships • Social Support • Spirituality 	<p>Each of the 15 domains consists of two components – the respondent’s perception of “Importance” and “Satisfaction” with respect to the domain.</p> <p><i>Importance</i> is scored on a three-point scale (from 0 to 2) where “0” = “Not important,” “1” = “Important,” and “2” = “Extremely important.”</p> <p><i>Satisfaction</i> is scored on a six-point scale (from -3 to 3) where “-3” = “Very dissatisfied,” “-2” = “Somewhat dissatisfied,” “-1” = “A little dissatisfied,” “1” = “A little satisfied,” “2” = “Somewhat satisfied,” and “3” = “Very satisfied.”</p>

APPENDIX E: BETWEEN-SUBJECTS MAIN EFFECTS OF HPD VERSUS LPD

Table 1. Differences in SCL-90-R T-scores – HPD versus LPD participants

SCL-90-R Domain	HPD		LPD		Psychological Distress Main Effect	
	n	Mean (SD)	n	Mean (SD)	F	Effect Size η^2_p
Anxiety	63	58.94 (10.31)	248	47.87 (8.64)	75.94**	0.20
Depression	68	62.12 (8.76)	246	49.76 (8.16)	118.29**	0.27
Hostility	70	62.28 (8.66)	243	51.26 (8.69)	87.52**	0.22
Interpersonal Sensitivity	60	58.45 (8.38)	247	50.12 (7.91)	52.33**	0.15
Obsessive Compulsive	54	62.88 (8.75)	243	51.92 (8.55)	71.96**	0.20
Paranoia	77	59.94 (10.03)	249	49.42 (7.86)	91.85**	0.22
Phobic Anxiety	73	60.23 (8.72)	248	51.78 (7.26)	69.50**	0.18
Psychoticism	73	60.50 (8.38)	248	49.46 (6.73)	133.64**	0.30
Somatization	73	59.54 (9.81)	249	49.65 (8.89)	66.69**	0.17
GSI	55	63.22 (8.63)	245	50.44 (9.29)	87.02**	0.23

* = $p < 0.05$, ** = $p < 0.001$

Table 2. Differences in pain interference ratings – HPD versus LPD participants

Interference of Pain on...	HPD		LPD		Psychological Distress Main Effect	
	n	Mean (SD)	n	Mean (SD)	F	Effect Size η^2_p
General Functioning	39	3.48 (2.55)	64	1.60 (1.98)	15.007	0.13
Mood	38	3.31 (2.46)	62	1.06 (1.53)	50.865	0.34
Stress	39	3.27 (2.44)	63	1.18 (1.54)	39.837	0.28
Sleep	39	3.31 (2.87)	63	1.01 (1.64)	34.525	0.26

* = $p < 0.05$, ** = $p < 0.001$

Table 3. Satisfaction with falling asleep, staying asleep and waking up at the desired time – HPD versus LPD participants

Satisfaction with...	HPD		LPD		Psychological Distress Main Effect	
	n	Mean (SD)	N	Mean (SD)	F	Effect Size η^2_p
Falling Asleep	92	-0.30 (1.70)	286	1.33 (1.50)	76.33**	0.17
Staying Asleep	92	-0.33 (1.68)	286	1.16 (1.57)	60.69**	0.14
Waking Up at Desired Time	92	0.61 (1.72)	286	1.74 (1.32)	42.76**	0.10

* = $p < 0.05$, ** = $p < 0.001$

Table 4. Ratings of problems with daily function, quality of life and distress due to sleep problems – HPD versus LPD participants

Sleep Problems Affecting...	HPD		LPD		Psychological Distress Main Effect	
	n	Mean (SD)	N	Mean (SD)	F	Effect Size η^2_p
Functioning	92	5.00 (2.27)	286	2.62 (2.05)	88.29**	0.19
Quality of Life	92	4.22 (2.34)	286	2.09 (2.08)	68.08**	0.15
Distress	92	4.55 (2.62)	286	1.98 (2.12)	90.71**	0.19

* = $p < 0.05$, ** = $p < 0.001$

Table 5. Satisfaction ratings of 15 domains of health, relationships and quality of life – HPD versus LPD participants

Satisfaction With...	HPD		LPD		Psychological Distress Main Effect	
	n	Mean (SD)	N	Mean (SD)	F	Effect Size η^2_p
Children	61	1.92 (1.42)	168	2.42 (0.93)	9.70	0.04
Family Relationships	79	1.36 (1.40)	274	1.88 (1.08)	12.30	0.03
Marriage	66	1.05 (2.05)	201	1.87 (1.48)	12.68	0.05
Command Support	91	0.33 (1.77)	275	1.15 (1.39)	20.57	0.05
Financial Situation	91	1.05 (1.51)	282	1.54 (1.17)	10.30	0.03
Occupation	91	0.60 (1.80)	280	1.39 (1.26)	21.72	0.06
Psychological Health	91	0.65 (1.52)	285	1.90 (0.89)	91.57	0.20
Quality of Life	91	1.04 (1.51)	273	1.87 (0.98)	36.91	0.09
Sexual Relationships	85	0.55 (1.82)	271	1.62 (1.47)	30.19	0.08
Social Support	87	1.50 (1.33)	279	2.08 (0.92)	21.26	0.06
Spirituality	85	1.26 (1.32)	271	1.67 (1.00)	21.26	0.03
Diet	89	0.63 (1.42)	278	1.35 (1.10)	24.84	0.06
Family Diet	78	1.06 (1.45)	244	1.51 (1.13)	8.20	0.02
Fitness	90	0.25 (1.61)	275	1.38 (1.15)	53.71	0.13
General Health	91	0.62 (1.54)	279	1.74 (0.90)	72.65	0.16

* = $p < 0.05$, ** = $p < 0.001$

APPENDIX F: SCL-90-R ANOVA TABLE

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Anxiety	Psychological Distress ¹	12298.405	1	12298.405	75.94	<0.001***
	Between Error ²	50038.990	309	161.938		
	Session ³	125.744	1	125.744	2.68	0.103
	Session x Psychological Distress ⁴	83.763	1	83.763	1.78	0.183
	Within Error ⁵	14520.224	309	46.991		
Depression	Psychological Distress	16259.933	1	16259.933	118.29	<0.001***
	Between Error	42888.768	312	137.464		
	Session	1449.998	1	1449.998	39.46	<0.001***
	Session x Psychological Distress	70.074	1	70.074	1.91	0.168
	Within Error	11464.671	312	36.746		
Hostility	Psychological Distress	13202.650	1	13202.650	87.52	<0.001***
	Between Error	46914.986	311	150.852		
	Session	2311.154	1	2311.154	49.85	<0.001***
	Session x Psychological Distress	279.301	1	279.301	6.02	0.015*
	Within Error	14418.885	311	46.363		
Interpersonal Sensitivity	Psychological Distress	6700.218	1	6700.218	52.33	<0.001***
	Between Error	39052.153	305	128.040		
	Session	938.431	1	938.431	23.53	<0.001***
	Session x Psychological Distress	252.021	1	252.021	6.32	0.013*
	Within Error	12162.741	305	39.878		
Obsessive-Compulsive	Psychological Distress	10614.142	1	10614.142	71.96	<0.001***
	Between Error	43514.306	295	147.506		
	Session	1401.482	1	1401.482	35.71	<0.001***
	Session x Psychological Distress	20.397	1	20.397	0.52	0.472
	Within Error	11577.087	295	39.244		
Paranoia	Psychological Distress	13017.373	1	13017.373	91.85	<0.001***
	Between Error	45919.420	324	141.727		

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
	Session	1288.308	1	1288.308	27.59	<0.001***
	Session x Psychological Distress	168.541	1	168.541	3.61	0.058
	Within Error	15129.049	324	46.695		
Phobic Anxiety	Psychological Distress	8055.203	1	8055.203	69.5	<0.001***
	Between Error					
	Session	36970.566	319	115.895		
	Session x Psychological Distress	511.498	1	511.498	11.99	0.001***
	Within Error	67.685	1	67.685	1.59	0.209
	Psychological Distress	13604.551	319	42.648		
Psychoticism	Between Error	13597.814	1	13597.814	133.64	<0.001***
	Session	32356.772	318	101.751		
	Session x Psychological Distress	354.046	1	354.046	8.2	0.005**
	Within Error	1.296	1	1.296	0.03	0.863
	Psychological Distress	13726.828	318	43.166		
Somatization	Between Error	11048.634	1	11048.634	66.69	<0.001***
	Session	53018.757	320	165.684		
	Session x Psychological Distress	964.856	1	964.856	24.02	<0.001***
	Within Error	85.682	1	85.682	2.13	0.145
	Psychological Distress	12853.120	320	40.166		
Global Severity Index (GSI)	Between Error	14656.917	1	14656.917	87.02	<0.001***
	Session	50189.776	298	168.422		
	Session x Psychological Distress	1703.861	1	1703.861	45.26	<0.001***
	Within Error	17.781	1	17.781	0.47	0.493
	Psychological Distress	11219.412	298	37.649		

* Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

¹ Between-groups effect of psychological distress (i.e., HPD versus LPD participants)

² Between-groups error

³ Within-groups effect of session (i.e. pre- versus post-effect across all participants)

⁴ Session by psychological distress interaction

⁵ Within-group error

APPENDIX G: PAIN ASSESSMENT ANOVA TABLE

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Pain Affects General Activity	Psychological Distress ¹	128.897	1	128.897	15.007	<0.001***
	Between Error ²	867.523	101	8.589		
	Session ³	0.176	1	0.176	0.069	0.794
	Session x Psychological Distress ⁴	7.312	1	7.312	2.860	0.094
	Within Error ⁵	258.253	101	2.557		
Pain Affects Mood	Psychological Distress	299.622	1	299.622	50.865	<0.001***
	Between Error	577.273	98	5.891		
	Session	8.136	1	8.136	2.731	0.102
	Session x Psychological Distress	4.536	1	4.536	1.523	0.220
	Within Error	291.959	98	2.979		
Pain Causes Stress	Psychological Distress	230.259	1	230.259	39.837	<0.001***
	Between Error	578.001	100	5.780		
	Session	0.213	1	0.213	0.073	0.787
	Session x Psychological Distress	0.409	1	0.409	0.140	0.709
	Within Error	291.694	100	2.917		
Pain Affects Sleep	Psychological Distress	323.794	1	323.794	34.525	<0.001***
	Between Error	937.849	100	9.378		
	Session	11.391	1	11.391	2.770	0.099
	Session x Psychological Distress	0.803	1	0.803	0.195	0.659
	Within Error	411.223	100	4.112		

* Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

¹ Between-groups effect of psychological distress (i.e., HPD versus LPD participants)

² Between-groups error

³ Within-groups effect of session (i.e. pre- versus post-effect across all participants)

⁴ Session by psychological distress interaction

⁵ Within-group error

APPENDIX H: SLEEP ASSESSMENT ANOVA TABLE

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Satisfaction with Falling Asleep	Psychological Distress ¹	367.603	1	367.603	76.33	<0.001***
	Between Error ²	1810.877	376	4.816		
	Session ³	109.957	1	109.957	75.4	<0.001***
	Session x Psychological Distress ⁴	12.203	1	12.203	8.37	0.004**
	Within Error ⁵	548.327	376	1.458		
Satisfaction with Staying Asleep	Psychological Distress	310.016	1	310.016	60.69	<0.001***
	Between Error	1920.574	376	5.108		
	Session	66.086	1	66.086	40.57	<0.001***
	Session x Psychological Distress	2.032	1	2.032	1.25	0.265
	Within Error	612.421	376	1.629		
Satisfaction with Waking Up at Desired Time	Psychological Distress	174.492	1	174.492	42.76	<0.001***
	Between Error	1522.050	373	4.081		
	Session	22.677	1	22.677	19.81	<0.001***
	Session x Psychological Distress	6.717	1	6.717	5.87	0.016
	Within Error	426.921	373	1.145		
Sleep Problems Affecting Daily Function	Psychological Distress	785.208	1	785.208	88.29	<0.001***
	Between Error	3344.057	376	8.894		
	Session	185.574	1	185.574	43.19	<0.001***
	Session x Psychological Distress	0.177	1	0.177	0.04	0.839
	Within Error	1615.440	376	4.296		
Sleep Problems Affecting Quality of Life	Psychological Distress	629.322	1	629.322	68.08	<0.001***
	Between Error	3466.276	375	9.243		
	Session	10.159	1	10.159	2.56	0.111
	Session x Psychological Distress	0.021	1	0.021	0.01	0.942
	Within Error	1490.473	375	3.975		
Sleep Problems Cause Distress	Psychological Distress	918.643	1	918.643	90.71	<0.001***
	Between Error	3797.538	375	10.127		
	Session	40.974	1	40.974	11.65	0.007**
	Session x Psychological Distress	20.790	1	20.790	5.91	0.016*

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
	Within Error	1318.546	375	3.516		

* Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

¹ Between-groups effect of psychological distress (i.e., HPD versus LPD participants)

² Between-groups error

³ Within-groups effect of session (i.e. pre- versus post-effect across all participants)

⁴ Session by psychological distress interaction

⁵ Within-group error

APPENDIX I: CHANGES IN ATTITUDES ACROSS 15 DOMAINS BETWEEN PRE- AND POST-QUESTIONNAIRES

Domain	Importance	Pre		Post		χ^2	p
		n	%	n	%		
Children	Not Important	3	1.26	2	0.84	1.1	0.780
	Important	11	4.62	11	4.62		
	Extremely Important	224	94.12	225	94.54		
	Total	238		238			
Command Support	Not Important	58	15.80	34	9.26	20.5	<0.001***
	Important	192	52.32	179	48.77		
	Extremely Important	117	31.88	154	41.96		
	Total	367		367			
Diet	Not Important	31	8.64	17	4.74	13.5	0.003**
	Important	174	48.47	162	45.13		
	Extremely Important	154	42.90	180	50.14		
	Total	359		359			
Family Diet	Not Important	11	3.42	15	4.66	17.0	<0.001***
	Important	143	44.41	102	31.68		
	Extremely Important	168	52.17	205	63.66		
	Total	322		322			
Family Relationships	Not Important	47	12.88	43	11.78	17.0	<0.001***
	Important	151	41.37	118	32.33		
	Extremely Important	167	45.75	204	55.89		
	Total	365		365			
Financial	Not Important	2	0.53	2	0.53	1.5	0.675
	Important	98	26.20	110	29.41		
	Extremely Important	274	73.26	262	70.05		
	Total	374		374			
Fitness	Not Important	4	1.14	0	0.00	1.5	0.266
	Important	108	30.77	101	28.77		

Soldier 360° Evaluation Final Report

Domain	Importance	Pre		Post		χ^2	p
		n	%	n	%		
	Extremely Important	239	68.09	250	71.23		
	Total	351		351			
Health	Not Important	3	0.83	0	0.00	6.4	0.012*
	Important	95	26.39	75	20.83		
	Extremely Important	262	72.78	285	79.17		
	Total	360		360			
Marriage	Not Important	7	2.55	3	1.09	9.8	0.020*
	Important	45	16.36	30	10.91		
	Extremely Important	223	81.09	242	88.00		
	Total	275		275			
Psychological Health	Not Important	7	1.88	3	0.81	23.6	<0.001*
	Important	139	37.37	95	25.54		
	Extremely Important	226	60.75	274	73.66		
	Total	372		372			
Occupation	Not Important	28	7.76	10	2.77	17.2	<0.001***
	Important	179	49.58	176	48.75		
	Extremely Important	154	42.66	175	48.48		
	Total	361		361			
Quality of Life	Not Important	0	0.00	0	0.00	4.7	0.030*
	Important	84	23.14	65	17.91		
	Extremely Important	279	76.86	298	82.09		
	Total	363		363			
Sexual Relationships	Not Important	10	2.79	9	2.51	5.3	0.153
	Important	116	32.40	96	26.82		
	Extremely Important	232	64.80	253	70.67		
	Total	358		358			
Social Support	Not Important	28	7.63	16	4.36	14.2	0.003**
	Important	185	50.41	163	44.41		
	Extremely Important	154	41.96	188	51.23		
	Total	367		367			
Spirituality	Not Important	84	22.52	33	8.85	72.3	<0.001***
	Important	159	42.63	148	39.68		
	Extremely Important	130	34.85	192	51.47		
	Total	373		373			

* Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

APPENDIX J: SATISFACTION WITH HEALTH, RELATIONSHIPS AND QUALITY OF LIFE DOMAINS ANOVA TABLE

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Children	Psychological Distress ¹	22.654	1	22.654	9.699	0.002**
	Between Error ²	530.215	227	2.336		
	Session ³	2.147	1	2.147	3.065	0.081
	Session x Psychological Distress ⁴	0.007	1	0.007	0.010	0.919
	Within Error ⁵	159.019	227	0.701		
Command Support	Psychological Distress	91.815	1	91.815	20.573	<0.001***
	Between Error	1624.462	364	4.463		
	Session	0.770	1	0.770	0.657	0.418
	Session x Psychological Distress	0.531	1	0.531	0.453	0.501
	Within Error	426.369	364	1.171		
Diet	Psychological Distress	69.449	1	69.449	24.842	<0.001***
	Between Error	1020.421	365	2.796		
	Session	23.440	1	23.440	21.180	<0.001***
	Session x Psychological Distress	0.061	1	0.061	0.055	0.815
	Within Error	403.942	365	1.107		
Family Diet	Psychological Distress	24.210	1	24.210	8.201	0.004**
	Between Error	944.680	320	2.952		
	Session	5.105	1	5.105	5.828	0.016*
	Session x Psychological Distress	0.527	1	0.527	0.602	0.438
	Within Error	280.276	320	0.876		
Family Relationships	Psychological Distress	32.955	1	32.955	12.302	0.001***
	Between Error	940.233	351	2.679		
	Session	9.487	1	9.487	11.379	0.001***
	Session x Psychological Distress	0.403	1	0.403	0.483	0.487
	Within Error	292.626	351	0.834		
Financial Situation	Psychological Distress	32.835	1	32.835	10.297	0.001***
	Between Error	1183.011	371	3.189		
	Session	11.613	1	11.613	15.325	<0.001***

Soldier 360° Evaluation Final Report

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
	Session x Psychological Distress	5.125	1	5.125	6.763	0.010**
	Within Error	281.147	371	0.758		
Fitness	Psychological Distress	174.565	1	174.565	53.710	<0.001***
	Between Error	1179.794	363	3.250		
	Session	62.523	1	62.523	61.201	<0.001***
	Session x Psychological Distress	1.638	1	1.638	1.603	0.206
	Within Error	370.838	363	1.022		
General Health	Psychological Distress	173.028	1	173.028	72.651	<0.001***
	Between Error	876.444	368	2.382		
	Session	16.596	1	16.596	22.503	<0.001***
	Session x Psychological Distress	0.007	1	0.007	0.009	0.923
	Within Error	271.405	368	0.738		
Marriage	Psychological Distress	67.870	1	67.870	12.675	<0.001***
	Between Error	1419.005	265	5.355		
	Session	11.229	1	11.229	17.667	<0.001***
	Session x Psychological Distress	4.353	1	4.353	6.848	0.009**
	Within Error	168.439	265	0.636		
Occupation	Psychological Distress	86.586	1	86.586	21.716	<0.001***
	Between Error	1471.291	369	3.987		
	Session	3.463	1	3.463	2.502	0.115
	Session x Psychological Distress	3.959	1	3.959	2.860	0.092
	Within Error	510.880	369	1.384		
Psychological Health	Psychological Distress	212.720	1	212.720	91.566	<0.001***
	Between Error	868.856	374	2.323		
	Session	22.377	1	22.377	24.950	<0.001***
	Session x Psychological Distress	1.456	1	1.456	1.624	0.203
	Within Error	335.424	374	0.897		
Quality of Life	Psychological Distress	94.375	1	94.375	36.914	<0.001***
	Between Error	925.498	362	2.557		
	Session	20.192	1	20.192	22.643	<0.001***

Domain	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
	Session x Psychological Distress	1.055	1	1.055	1.183	0.277
	Within Error	322.824	362	0.892		
Sexual Relationship	Psychological Distress	146.819	1	146.819	30.192	<0.001***
	Between Error	1721.466	354	4.863		
	Session	32.690	1	32.690	30.923	<0.001***
	Session x Psychological Distress	0.949	1	0.949	0.898	0.344
	Within Error	374.235	354	1.057		
Social Support	Psychological Distress	45.273	1	45.273	21.263	<0.001***
	Between Error	775.041	364	2.129		
	Session	7.245	1	7.245	9.478	0.002**
	Session x Psychological Distress	1.994	1	1.994	2.608	0.107
	Within Error	278.255	364	0.764		
Spirituality	Psychological Distress	45.273	1	45.273	21.263	<0.001***
	Between Error	775.041	364	2.129		
	Session	7.245	1	7.245	9.478	0.002**
	Session x Psychological Distress	1.994	1	1.994	2.608	0.107
	Within Error	278.255	364	0.764		

* Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at the 0.001 level

¹ Between-groups effect of psychological distress (i.e., HPD versus LPD participants)

² Between-groups error

³ Within-groups effect of session (i.e. pre- versus post-effect across all participants)

⁴ Session by psychological distress interaction

⁵ Within-group error