PSYCHOLOGICAL WELL-BEING IN IRAQ AND AFGHANISTAN VETERANS: A BROADER MODEL OF RISK AND PROTECTIVE FACTORS

by

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Psychological Well-Being in Iraq and Afghanistan Veterans: A Broader Model of Risk and Protective Factors

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List of Abbreviations

DASS-D: Depression Anxiety Stress Subscales-Depression Subscale
ISI: Insomnia Severity Index
PCL: Posttraumatic Stress Disorder Checklist
PCL-M: Posttraumatic Stress Disorder Checklist-Military Version
PTG: Posttraumatic Growth
PTGI: Posttraumatic Growth Inventory
PTSD: Posttraumatic Stress Disorder
PTSS: Posttraumatic Stress Symptoms
PVS III-R: Personal Views Survey III-Revised
PWB: Psychological Well-Being
QOL: Quality of Life
SEM: Structural Equation Modeling
SPWB: Ryff's Scales of Psychological Well-Being
SWB: Subjective Well-Being
TRADOC: Training and Doctrine Command
VA: Veteran Affairs
VIA-IS: Values In Action-Inventory of Strengths

Abstract

PSYCHOLOGICAL WELL-BEING IN IRAQ AND AFGHANISTAN VETERANS: A BROADER MODEL OF RISK AND PROTECTIVE FACTORS

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Veterans of the recent military conflicts in Afghanistan and Iraq have been the subject of multiple studies, with the majority focusing on elevated rates of posttraumatic stress disorder (PTSD) and other related negative outcomes (traumatic brain injury, suicide, marital problems). There are a handful of studies focusing on quality of life and well-being, but most are limited to constructs of meaning in life and posttraumatic growth, and the associations of such constructs with PTSD symptoms. To fully understand positive outcomes in this population, a broader understanding of psychological health and well-being, as well as a broader model of risk and protective factors, is needed. The present study focuses on the broad construct of psychological well-being (PWB) in veterans who have served during the recent conflicts in Iraq and Afghanistan, with an examination of other risk factors (sleep problems and depression) beyond PTSD symptoms, as well as a positive facet of the military experience (enhanced self-regulation). Primary hypotheses

were that sleep and depression would account for some of the negative association of PTSD with PWB, that self-regulation would be positively associated with PWB even when accounting for these risk factors, and that the association of risk factors with PWB would be weaker at higher levels of self-regulation.

Two hundred thirty-eight student veterans completed self-report measures at baseline, with 115 completing measures again 2 to 3 months later. PWB was modeled as a latent variable, and all analyses were completed cross-sectionally at both time points and longitudinally across time points. The significant, negative correlations of PTSD scores with PWB scores within and across both time points confirmed the first hypothesis that PTSD symptoms would have a significant negative association with psychological well-being. Structural equation models examining the simultaneous associations of PTSD, depression, sleep problems, and self-regulation revealed significant, large associations of PWB with depression and self-regulation in expected directions within and across both time points. Associations with PTSD were small, with significant associations in cross-sectional models but not the longitudinal model. Associations with sleep were also small, with a significant association only in one of the cross-sectional models. Overall, the pattern of findings was consistent with the notion that depression, but not sleep problems, accounts for some of the association of PTSD with PWB, in partial support of hypothesis 2. Also, in support of hypothesis 3, self-regulation had a significant positive association with psychological well-being, even when controlling for the effects of PTSD, sleep problems, and depression. Finally, interactions between self-

regulation and the three risk factors were nonsignificant in both cross-sectional models, but the interactions of self-regulation with both PTSD and depression were significant in the longitudinal model. Contrary to our hypotheses, however, the negative associations of both PTSD and depressive symptoms with later PWB grew *stronger* as levels of self-regulation increased. This finding may indicate that higher scores on our measure of self-regulation indicate maladaptive attempts to control one's emotions, but further research that attempts to replicate these findings is needed.

Overall, findings support the need for examining a broader model of risk and protective factors predictive of outcomes in veterans who served during the recent era of wars in Iraq and Afghanistan.

Introduction

Veterans of the recent military conflicts in Afghanistan and Iraq have been the subject of multiple studies, with the majority focusing on elevated rates of posttraumatic stress disorder (PTSD) and other related negative outcomes (e.g., Hoge, Auchterlonie, & Milliken, 2006; Joseph & Linley, 2008; Lemaire & Graham, 2011; RAND Corporation, 2011). In contrast, few studies have examined positive outcomes in this population. Given the length and frequency of recent deployments, the high likelihood of exposure to potentially traumatic events, and the increased public awareness of PTSD and other problems after Vietnam, the focus on negative outcomes is understandable. Moreover, this research has significantly informed conceptualization and treatment of the negative outcomes of military service. However, the examination of positive outcomes, particularly in the context of PTSD symptoms that may be present, has the potential to provide clinicians with novel information about individual strengths that can be utilized to inform military training and prevention efforts, and to address PTSD and comorbid symptoms more effectively in treatment.

Ryff and Singer (1996) point out that, historically, positive outcomes in clinical research have been characterized as the lack of distress, such that they are mutually exclusive. However, there is evidence challenging this psychological model of

dysfunction. For instance, Jennings and colleagues (2006) found that stress-related growth from combat-related PTSD was positively associated with veteran adaptation later in life. Thus, positive outcomes in this population are not simply the absence of posttraumatic stress symptoms (PTSS) or the disorder (PTSD). Rather they include continued striving, thriving, and success with coming to grips with the traumatic experience and the existential challenges of life. There are many constructs that attempt to capture these elements in the research literature, most notably well-being (both subjective and psychological), quality of life, and posttraumatic growth.

Well-being, the umbrella term inclusive of subjective and psychological well-being, refers to optimal psychological functioning and, as such, is frequently utilized to assess positive outcomes in psychological terms. Ryan and Deci (2001), in their review of well-being, point to two distinct conceptualizations. The first, described by Aristotle as hedonic well-being, focuses on happiness (Seligman & Csikszentmihalyi, 2000) and maximizing pleasure, whereas the second focuses on growth (Horney, 1950; Rogers, 1961) and development encapsulated in eudaimonic well-being. Hedonic well-being is captured by the construct of subjective well-being (SWB; Diener & Lucas, 1999), and research in this area typically defines SWB outcomes in terms of happiness, experiencing pleasure and avoiding pain. SWB is often operationalized as the summation of positive mood minus negative mood plus life satisfaction (Diener, 1984; Seligman & Csikszentmihalyi, 2000), or sometimes, more simply, as self-report of life satisfaction

(Diener & Lucas, 1999; Diener, Emmons, Larsen, & Griffin, 1985). Thus, overall, SWB defines well-being in terms of experienced pleasure.

In contrast, the eudaimonic conceptualization of well-being, typically referred to as psychological well-being (PWB), suggests that well-being goes beyond simple happiness and realization of pleasures of the body and mind to include self-realization of one's true potential (Kubovy, 1999). As such, eudaimonic well-being focuses on capturing the degree to which individual outcomes are consistent with what one values (Waterman, 1993). This is not to say eudaimonic behaviors cannot be pleasurable; rather, the focus is on an outcome valued by the individual, even if the behavior is not the one generating the most pleasure. Ryff and Singer (2008) expand on Waterman's definition of eudaimonic well-being, describing specific types of behaviors that reflect actions congruent with attempts to realize one's true potential. Moreover, they conceptualize these eudaimonic actions as strivings throughout one's lifespan, leading to personal growth and development toward one's realized fully functioning potential. Ryff and Singer (2008) assert that their developmental approach to defining eudaimonic well-being, which they refer to as psychological well-being, is the most comprehensive description of well-being. Thus, psychological well-being (PWB) is distinct from SWB, in that it defines well-being in terms of growth and development as reflected by self-realization and functioning congruent with what one values, instead of simply what one finds pleasurable in the moment. Of note, although these two constructs are distinct, we

know SWB is related to PWB (Keyes, Shmotkin, & Ryff, 2002), implying that behavior reflecting actions congruent with what one values can also be pleasurable.

Quality of life (QOL; Diener, Emmons, Larsen, & Griffin, 1985; Frisch, 1994) represents one of the broadest constructs for examining positive functioning. QOL typically includes social-material conditions (e.g., material wealth and social networking), functioning as indicated by role performance, and life satisfaction (Ware & Sherbourne, 1992). Social-material conditions reflect both positive relations with others and having the resources to do what you need and want to do in life. Functioning reflects positive outcomes associated with both physical abilities and performance in various life roles, such as family and occupational roles. Life satisfaction reflects positive outcomes associated with overall happiness and pleasure. As such, the construct of QOL overlaps with SWB through its assessment of life satisfaction, but can be viewed as a broader model of SWB, as it captures satisfaction in the domains of health, work, relationships, and community (Lunney & Schnurr, 2007). However, QOL typically does not capture the more nuanced elements of PWB.

Finally, a model for conceptualizing positive adaptation specific to a traumatic experience is the conceptual framework of posttraumatic growth (PTG), proposed by Tedeschi and Calhoun (1995). Multiple studies have found that some individuals report positive life changes in general after experiencing traumatic events (Linley & Joseph, 2004; Tedeschi & Calhoun, 1995; Tedeschi, Park, & Calhoun, 1998). Furthermore, Jennings and colleagues (2006) suggest growth related to combat exposure is positively

associated with adaptation later in life. Specifically, they found high levels of combat exposure increased the opportunity for stress-related growth (even while simultaneously being associated with decreased social support). The more specific construct of posttraumatic growth (PTG) refers to the process of developing a deeper appreciation for living and a renewed sense of purpose and strength as a result of having experienced a trauma (Tedeschi & Calhoun, 1995). Conceptually, the construct of PTG is somewhat similar to the broad model of psychological well-being that includes domains like meaning and purpose in life, but PTG is narrower in its focus on growth specifically related to a trauma. Thus, it follows that general positive life changes resulting from experiencing trauma may be captured by both PTG and PWB, but broader positive life outcomes may be best captured by PWB.

Ultimately, of all of these constructs, PWB is perhaps the most complex way to measure overall psychological health. SWB and life satisfaction are limited to focus primarily on momentary positive affect, whereas QOL is limited both by too broad a focus on psychological functioning and by a lack of depth in focus on psychological health and adaptability. The multidimensional nature of QOL results in a construct more focused on overall functioning than with psychological health. Moreover, the depth of psychological health as reflected in growth and development congruent with one's values is simply overlooked in QOL. Thus, with both its broad and deep assessments of well-being, PWB is the most complex approach to assessing overall psychological health.

One of the broadest models of PWB is the conceptual framework proposed by Ryff (Ryff, 1989; Ryff & Keyes, 1995; Ryff & Singer, 1996, 2008). This framework is based on an individual's self-realization arising from six primary dimensions of psychological functioning to which individuals are challenged to thrive: environmental mastery, personal growth, purpose in life, autonomy, self-acceptance, and positive relations with others. As such, the broad construct of PWB can be broken down into subcomponents that, while related, may be differentially associated with risk and protective factors. The dimension of environmental mastery refers to individuals' sense of control over their surroundings and engagement in making the most of the opportunities their present location affords. Personal growth encapsulates individuals' realization of their potential and sense of continued development and openness to new experiences. Purpose in life reflects not only individuals' sense of meaning in their lives so far, but also the extent to which they have life goals and a guiding belief system that direct their future actions and give purpose to their lives. The construct of autonomy refers to the extent to which individuals are self-determining in their cognitions and behaviors, rather than being concerned with the expectations and evaluations of others. Self-acceptance is characterized by an acceptance of both personal strengths and weaknesses, which arises from long term self-awareness and evaluation. Of note, self-acceptance is more comprehensive than self-esteem, in that it focuses more on self-actualization (Maslow, 1968), optimal functioning (Rogers, 1961) and acceptance of the self in both the past and the present (Erikson, 1959). Finally, the domain of positive

relations with others refers to having satisfying relationships with others and being capable of empathy, affection, and intimacy.

This study focuses on the development of a broad understanding of the risk and protective factors for PWB in the recent veteran population, using Ryff's conceptual framework. The domains are explored collectively, as initial analyses suggested no need to examine them separately. Although no research to date has examined this model of PWB in veterans, relevant literature on other positive outcomes (e.g., QOL, SWB) in veterans is reviewed below.

Prior Literature on Positive Outcomes in the Context of PTSD

There is a limited body of research regarding positive outcomes like QOL, SWB, and PWB in veterans of the wars in Iraq and Afghanistan. However, these types of outcomes are rarely assessed via the same constructs or measures. For instance, Gladis, Gosch, Dishuk, and Crits-Christoph (1999) point to the lack of agreement for an operational definition of the QOL construct and the use of subjective versus objective indicators of QOL as issues in the assessment of QOL alone. Thus, it is important to attend to the specific constructs and measures used, when reviewing prior findings on these types of outcomes in the combat veteran population.

A handful of studies have examined PTSD in relation to several aspects of QOL, although very few studies have looked at the QOL construct itself. Such studies have generally found negative associations of PTSD with aspects of QOL (Sayers, Farrow, Ross, & Oslin, 2009; Vasterling, Proctor, Friedman, Hoge, Heeren, King, & King, 2010).

Sayers and colleagues (2009) surveyed 199 veterans of the wars in Iraq and Afghanistan referred to the Philadelphia Veterans Affairs (VA) Medical Center for behavioral health evaluations from April 2006 to August 2007. These authors found that 75% of married or cohabitating veterans dealing with posttraumatic stress symptoms (PTSS) were also dealing with some type of life satisfaction problem, such as reporting their children withdrawing from them (25%), and functioning problems, such as being unsure about their role in the family (37%) and feeling like a guest in their household (40.7%). Although these measures do not capture the entirety of QOL, they do suggest that PTSS are negatively associated with elements of this construct.

Vasterling and colleagues (2010) assessed PTSD symptoms and various concerns in 774 soldiers (670 regular active duty; 104 National Guard), of whom all but 26 (22 regular active duty; 4 National Guard) were deployed to Iraq for a 12-month rotation between April 2003 to September 2006. This group reported that, in National Guard soldiers, higher levels of PTSD symptoms and post-deployment stress were related to unemployment concerns, which map onto the QOL domain of occupational role performance. In active duty soldiers, higher levels of PTSD symptoms were related to home-front concerns, which relate to the domain of life satisfaction. Thus, these findings lend further support to the notion that PTSS are negatively associated with elements of QOL in the recent cohort of veterans.

In a rare 12-month longitudinal examination of PTSD and QOL, Schnurr, Hayes, Lunney, McFall, and Uddo (2006) utilized a prominent measure of life satisfaction, the

Quality of Life Inventory (QOLI; Frisch, 1994), and an oft-used measure of functioning, the Short-Form Health Survey (SF-36; Ware & Sherbourne, 1992) in a sample of 325 Vietnam veterans being treated for PTSD. The authors utilized these measures to create a latent variable for psychosocial QOL, and a second latent variable for physical QOL. They then analyzed changes in these variables in relation to change in PTSD symptoms over time. They found that veterans with higher baseline levels of PTSD symptoms had lower levels of baseline QOL, and changes in PTSD symptoms over time were related to changes in QOL over the same time periods. Interestingly, veterans with higher baseline levels of PTSD also experienced greater change in psychosocial QOL over 7 months of weekly treatment. This finding is somewhat surprising, as it suggests a counterintuitive positive association between PTSD and subsequent QOL. However, it is also possible that individuals with greater PTSD symptoms at baseline had more room to improve in QOL as symptoms declined over time. These findings point to the need for further longitudinal research that tracks symptoms and positive outcomes over time in this population. Another interesting element of this study is that the statistical models explained much more of the variance in change in psychosocial QOL (77% of change from 0-7 months; 49% of change from 7-12 months) than change in physical QOL (19% of change from 0-7 months; 13% of change from 7-12 months). This contrast emphasizes the potential significance of psychological functioning in this context.

Although this study represents one of the most comprehensive examinations of QOL in this population, Schnurr and colleagues (2006) conducted their longitudinal

examination in a relatively disabled sample of Vietnam veterans enrolled in a randomized clinical trial of group therapy for PTSD. Over 70% of the sample was receiving Veteran Affairs (VA) benefits for physical or mental disabilities, including PTSD-related (60.6%) payments. Moreover, the average veteran's age was 50.69 years (*SD* = 3.68) and over half were unemployed (50.2%, *n* = 163). Thus, it is not clear that these results would generalize to the broader population of veterans, particular those from the more recent conflicts in Iraq and Afghanistan.

As noted above, there is ambiguity associated with what QOL really measures; however, there appears to be agreement among researchers that an essential component of QOL is the subjective assessment of life satisfaction (e.g., Gladis et al., 1999; Mendlowicz & Stein, 2000; Mogotsi et al., 2000). Lapierre, Schwegler, and LaBauve (2007) provide one of the few studies of veterans of the wars in Iraq and Afghanistan that utilized a specific measure of life satisfaction, the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). In a survey of 4,089 veterans of Iraq and/or Afghanistan, PTSD symptoms were negatively associated with life satisfaction. In addition, a large number of studies have looked at satisfaction in particular domains of life, specifically parenting and martial relationships. Again, these studies generally find PTSD associated with lower levels of satisfaction in both parenting (Gewirtz et al., 2010; Ruscio, Weathers, King, & King, 2002; Samper et al., 2004) and marital relationships (see meta-analyses by Lambert, Engh, Hasbun, & Holzer, 2012; Taft, Watkins, Stafford, Street, & Monson, 2011). Such studies bolster the notion that higher PTSD symptoms

are associated with lower levels of life satisfaction. However, these studies also fail to move beyond the constructs of satisfaction and happiness, to examine the broader ideas reflected in PWB, such as whether or not a person can thrive both when things are going well and when they are challenging.

Overall, studies examining positive outcomes related to QOL and SWB illustrate the negative association with PTSD. However, as Jennings and colleagues (2006) suggest, positive outcomes can be associated with PTSD. The most specific example of this notion is the construct of posttraumatic growth (PTG), which refers to the process of developing a deeper appreciation for living and a renewed sense of purpose and strength after a trauma experience (Tedeschi & Calhoun, 1995). Triplett and colleagues (Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012) suggest that PTG is associated with PTSD, such that as the process of PTG progresses, PTSD symptoms decrease. Although this suggests an association that is ultimately negative, it also suggests that positive outcomes like PTG can co-occur with PTSD for some time. Indeed, some studies have shown positive associations of PTSS and PTG (Calhoun, Cann, & Tedeschi, 2010; Calhoun & Tedeschi, 2004, 2006; Janoff-Bulman, 1992, 2006; Owens, Steger, Whitesell, & Herrera, 2009; Park & Ali, 2006). The expectation is that, over time, the process of PTG results in attributing meaning to the trauma, which in turn results in higher levels of PTG with lower levels of PTSD symptoms. Interestingly, the renewed sense of purpose and strength that is hypothesized as part of PTG is similar to elements of the broader construct of PWB. However, PTG limits the growth and development outcomes to those

specifically linked to working through the particular experience. Thus, PWB remains a potentially optimal construct for assessing positive outcomes representing growth and development congruent with one's self. To date, however, no research has investigated the association of PTSD with PWB in veterans of the recent conflicts. This study specifically addresses this gap in our knowledge.

Other Risk Factors

Beyond the lack of PWB research in this population, most studies limit their examination of positive outcomes to the consideration of the associations of PTSD with such outcomes. However, research has found 90% of combat veterans suffering PTSD symptoms also report sleep problems (Lewis, Creamer, & Failla, 2009). Moreover, in their examination of 533 primary care patients with anxiety disorders, Marcks, Weisberg, Edelen, and Keller (2010) found that sleep problems at intake predicted the course of PTSD (e.g., less PTSD remission after 5 years). In an 8-month longitudinal study of 659 Iraq combat veterans, Wright and colleagues (2011) found sleep problems to more accurately predict change in depression and PTSD symptoms, whereas depression and PTSD symptoms were not significant predictors of change in sleep problems. The authors suggested that short-term effects of sleep deprivation may also explain emotional reactivity and irritability. Most recently, Ribeiro and colleagues (2012) demonstrated that sleep problems may predict suicidal ideation and behavior better than depression and hopelessness for young adults in the military. Given these findings and the extremely high association of PTSD with sleep problems, it is plausible that sleep problems account

for some of the association of PTSD with QOL, SWB, and related outcomes. Indeed, sleep problems have also been found to be associated with QOL and well-being (Wright et al., 2011; Ribeiro et al., 2012). However, no study to date has examined the relative associations of sleep and PTSD with positive outcomes. If sleep does indeed account for some (or all) of the association between PTSD symptoms and psychological well-being, clinical treatment plans could be tailored to address individual veteran sleep problems in an attempt to improve psychological well-being even in the presence of PTSD symptoms.

Depression is also highly comorbid in veterans of Iraq and Afghanistan diagnosed with PTSD (Lapierre et al., 2007; Tanelian & Jaycox, 2008), and we know depression has negative associations with positive outcomes (Hellmuth, Stappenbeck, Hoerster, & Jakupcak, 2012; Pittman, Goldsmith, Lemmer, Kilmer, & Baker, 2011). Furthermore, recent examinations of comorbid depression and PTSD symptoms in veterans of the war in Iraq and Afghanistan reflect the unique contributions of depression in predicting negative outcomes. Hellmuth and colleagues (2012) utilized path analysis to illustrate a distinct pathway between PTSD numbing and hyperarousal clusters to suicidal ideation via depression. In addition, Pittman and colleagues (2011) found that depression had more effect on health-related QOL than PTSD. This finding was in support of findings by Ikin, Creamer, Sim, and McKenzie (2010) and consistent with other studies showing depression mediates the relationship between PTSD and health related QOL, such that negative outcomes are explained in terms of both PTSD and depression (Gudmundsdottir, Beck, Coffey, Miller, & Palyo, 2004). Based on these findings, it is plausible that

comorbid depression explains much of the negative associations of PTSD symptoms with positive outcomes. Again, however, no study to date has directly examined the relative impact of depression and PTSD on PWB specifically. To address these issues, the present study investigated the relative effects of PTSD, depression, and sleep problems on PWB in Iraq/Afghanistan veterans.

Protective Factors

Although military service clearly comes with risks, such as PTSD and associated problems, it may also come with many benefits. Today's military training is, in and of itself, designed to inhibit the development of psychological disorders as a result of combat exposure. Although each branch of the military executes the training through different programs, each includes training in both operational and psychological components. Specific to the U.S. Army, the branch with the majority of personnel exposed to combat in Iraq and Afghanistan, is the psychological component entitled *Resilience Training*, formerly called *Battlemind*, which targets known psychological challenges soldiers face when exposed to combat. The purpose of this training is to familiarize service members with known reactions to combat exposure while teaching effective coping techniques and strategies for seeking help (www.resilience.army.mil, 2012). Specifically, the operational training is a kind of pre-prolonged exposure technique that results in decreasing an individual soldier's psychological arousal to explosions and numbing the distress from seeing and hearing disturbing images, such as bloody body parts and cries for help from civilian and service member role players in

simulated battlefield training exercises. This component is combined with psycho-education about likely reactions to such situations.

Furthermore, beyond this institutional outfitting of *mentalkevlar* designed to prepare a service member to face future combat-related traumas, there are additional positives to military service that may function as protective factors. In some cases, protective factors may come directly in the decision to join the military. For example, Laub and Sampson (2005) posit that military service serves as a turning point for troubled youth, such that it fosters a path towards positive psychosocial development by removing youth from negative environments, changing routine behaviors, and encouraging teamwork. Additionally, the experience of a traumatic event is shown to serve as a turning point for many individuals, such that they thrive after experiencing extremely aversive events (Bonanno, 2008). It follows then that military service, with the institutional preparation for trauma described above and the enhanced likelihood of exposure to traumatic events, creates an unparalleled opportunity for stress-related growth.

Perhaps the broadest perspective on the potential benefits of military service comes from an examination of the longitudinal effects of combat exposure from a developmental perspective, conducted by Aldwin, Levenson, and Spiro (1994). These authors differentiated vulnerabilities and resilience to combat exposure and identified what they referred to as valued legacies of military service. In their investigation, they found that combat veterans repeatedly acknowledged 14 positive outcomes as a result of

their military experience. Some of these positive outcomes overlap with constructs discussed in this paper. For instance, three of the legacies are valuing life more, gaining a broader perspective on life, and gaining a clearer sense of direction. These constructs are quite similar to the process of PTG, although they were not necessarily tied directly to a traumatic experience.

Another valued legacy that Aldwin and colleagues (1994) identified is self-discipline, or learning to control one's behavior in response to impulses. The behavioral regulation involved with self-discipline is somewhat similar to the social psychological concept of self-regulation. Self-regulation, referred to by Baumeister and Exline (1999) as the *master virtue*, encapsulates an individual's ability to overcome selfish impulses for the goal of getting along with others and an individual's capacity for regulating responses to goals, priorities, and environmental demands (Tangney, Baumeister, & Boone, 2004). Of note, individuals with higher levels of self-regulation have been found to also possess higher levels of psychological well-being and self-esteem and lower levels of depression and anxiety (Tangney et al., 2004). Conversely, impairments of self-regulation have been shown to cause increased emotional distress and loss of trust in relationship and meaning in life (Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997). Thus, military veterans may have enhanced levels of self-regulation due to military service (i.e., consistent with the valued legacy of self-discipline), and this benefit might help offset the negative effects of other risk factors on PWB.

Another one of the valued legacies named by Aldwin and colleagues (1994) is learning to cope with adversity. Specifically, the authors described this in terms of maturational effects as evidenced by enhanced coping skills when confronting distress. This notion has several similarities to the construct of hardiness. Maddi (1997, 2002) defined hardiness in terms of how one responds to complex and changing situations, such that higher levels of hardiness represent both motivation and courage to become involved in the situation in an effort to both influence the situation and learn from it. Hardiness has been shown to lead to more confident responses in the face of extreme trauma and better use of active coping skills and available social support in the face of extreme distress (Florian, Mikulincer, & Taubman, 1995). Furthermore, Maddi and colleagues (2012) recently found psychological hardiness measured at West Point during the freshman year predicted leader adaptability 7 years later. In fact, psychological hardiness served as a better predictor of leader performance and adaptability than traditional military measures of performance. Moreover, in Bonanno's (2008) review of the evidence for human resilience, he noted consistent evidence that hardiness is associated with decreased negative outcomes in response to extreme stress. In sum, based on the valued legacy of coping with adversity, hardiness may be enhanced by military service and, as such, could operate as a protective factor for PWB.

Many of the remaining valued legacies overlap with some of the constructs captured by QOL and SWB, with some idiosyncratic constructs (e.g., pride as an American, appreciation for peace) included, as well. However, the legacies discussed

above point to factors that may in fact be enhanced by an individual's military service, perhaps offsetting some of the negative effects of other elements like combat exposure. Thus, this study also aimed to examine the role of both self-regulation and hardiness in a comprehensive model of both risk and protective factors for PWB in veterans of the recent conflicts in Iraq and Afghanistan.

Of note, this group of more recent veterans may be distinct from veterans of prior wars in a number of ways. Unfortunately, veterans of prior wars did not have the benefit of the mental health initiatives present today, including resiliency training, deployment cycle awareness, and relationship enhancement programs afforded veterans of our all-volunteer military. It is plausible that these types of initiatives have led to differences in the experience of combat-related PTSD symptoms and other risk and protective factors, as well as their associations with PWB. Thus, the current study fills some of the gap in knowledge about the experiences of this new veteran population.

Primary Aim

The present study aimed to gain an understanding of military service-related risk and protective factors for overall psychological well-being in veterans who served during the recent military conflicts in Iraq and Afghanistan. This is the first study to examine PWB in this population, rather than focusing on QOL, SWB, or other constructs that do not capture the totality of psychological well-being. In addition, this study moved beyond simple associations of PTSD with well-being, to develop a more comprehensive model of risk factors and protective factors that may exist in this population.

Specifically, this study aimed to examine the role of sleep and depression as additional risk factors beyond PTSD symptoms, and the potential buffering effect of self-regulation and psychological hardiness. Finally, given the differing patterns of associations between PTSD and well-being that emerged from Schnurr and colleagues' (2006) analysis of longitudinal vs. cross-sectional data, associations were analyzed both cross-sectionally and longitudinally.

Primary hypotheses were as follows:

H1: PTSD symptoms would have a significant negative association with psychological well-being.

H2: Effects of PTSD on psychological well-being would be partially accounted for by sleep problems and depression.

H3: Self-regulation and hardiness would have a significant positive association with psychological well-being, above and beyond the effects of PTSD, sleep problems, and depression.

H4: Self-regulation and hardiness would moderate the negative associations of PTSD, sleep problems, and depression with PWB, such that the associations would be weaker at higher levels of both self-regulation and hardiness.

Of note, as discussed above, the construct of PTG is largely contained within the broader construct of PWB and, thus, is not included in the overall hypotheses or models. However, data collected regarding PTG was also analyzed to evaluate the distinctiveness

of findings with regard to PWB vs. PTG, by testing all hypotheses above with regard to PTG in lieu of PWB (see Appendix A).

Exploratory Aim: PTSD Symptom Clusters

In addition, as a secondary aim of this study, specific clusters of PTSD symptoms were analyzed with respect to their association with PWB. Re-experiencing symptoms, characterized by flashbacks and nightmares (APA, 2013), are generally experienced as unwanted distressing and intrusive thoughts about the trauma that elicit strong negative emotions (Janoff-Bulman, 1992). Both situational avoidance symptoms and numbing/withdrawal symptoms, which are formally separated in the latest edition of the Diagnostic and Statistics Manual (DSM-5, APA, 2013), are characterized by behaviors associated with distancing an individual from their traumatic experience, and are generally viewed as temporary attempts to decrease the distress associated with trauma memories in an effort to cut off the feelings associated with them (Resick & Schnicke, 1992). Physiological arousal symptoms, characterized by hypervigilance and a constant state of tension (APA, 2013), are generally viewed in physical symptoms such as sleep disturbance, decreased concentration, irritability, and an over-reactivity to stimuli.

These symptom cluster definitions and some empirical research point to potential differences in the associations of specific clusters with overall PWB. In particular, the avoidance and numbing symptoms of PTSD appear associated with negative outcomes related to the PWB domains of personal growth and purpose in life. Kashdan and Kane (2011) examined the association of PTSS with meaning in life and PTG in a sample of

126 college students. Their cross-sectional study supported the association of PTSS with greater PTG and meaning in life when experiential avoidance symptoms were not present. However, in the presence of such symptoms, this association was weaker. Moreover, higher levels of avoidance may relate to lower levels of purpose in life, as a higher avoidant individual may lack direction or have goals for life beyond those related to avoidance behaviors. Rona and colleagues (Rona, Jones, Iverson, Hull, Greenberg, Fear et al., 2009) utilized a cross-sectional design to survey 4722 personnel from the U.K. military deployed to Iraq in 2003 who also participated in a major combat operation between January and April 2003. Their examination of the impact of PTSD on impairment found the avoidance and numbing cluster accounted for the greatest independent contribution to impairment. These findings are congruent with those found in civilian PTSD studies (Foa, Riggs, & Gershuny, 1995). Furthermore, researchers examining the association between PTSD and QOL in Kosovo war survivors (Kashdan, Morina, & Priebe, 2009) found experiential avoidance mediated the relationship between PTSD and QOL, such that the diagnosis of PTSD was non-significant. Finally, numbing/withdrawal symptoms are consistently the most common symptom cluster linked with relationship distress (review by Renshaw, Blais, & Caska, 2011).

Taken together, these studies highlight the significant association of the avoidance and numbing/withdrawal clusters with negative outcomes related to purpose in life and personal growth. Given that most studies that examine these clusters separately have found that numbing/withdrawal symptoms account for the greatest variance in outcomes

(e.g., Renshaw et al., 2011), numbing/withdrawal symptoms seemed likely to account for the majority of variance in PWB predicted by PTSD. As a secondary aim, this study examined the relative contribution of each cluster of PTSD symptoms to PWB. The main hypothesis was that, when all clusters were examined simultaneously, the numbing/withdrawal cluster would be most strongly negatively associated with PWB.

Method

Participants

A total of 238 student veterans completed online self-report measures relevant to the current study in 2013-2014. The 228 individuals who provided information about their gender reflected the general active duty military population fairly well, with 168 males (70.6%) and 60 females (25.2%). Student veterans averaged 36.29 years of age (*SD* = 9.58) and ranged from 22 to 67 years old. The majority (85%) of the sample was non-Hispanic White, with 5% African-American, 3% Asian, 3% American Indian, 2% Hispanic, and 2% other. The sample reflected slightly higher numbers of married individuals (*n* = 129; 54.2%) and individuals with children (*n* = 126; 52.9%) relative to the active duty population, but included a representative sample of unmarried student veterans with children (*n* = 26; 10.9%). The sample included 102 (42.9%) student veterans with no children.

At the time of the survey, 161 (67.6%) reported they were currently enrolled in college. Only 31 student veterans (13.0%) reported they were not utilizing their GI Bill education benefits to pursue their degree. The sample included student veterans from 78 different colleges and universities in the United States, with 26 (10.9%) reporting their education was entirely online.

The sample was representative of the military branches, including 139 (58.5%) Army, 31 (13%) Navy, 27 (11.4%) Air Force, 21 (8.8%) Marines, and 2 (0.8%) Coast Guard. The sample reflected multiple service statuses, including 92.5% reporting current or past active duty service, 20.6% reporting National Guard Status, and 22.7% reporting reserve status. Student veterans ranged in rank, including 26.5% junior enlisted (E1-E4), 39.1% junior non-commissioned officers (E5-E6), 9.6% senior non-commission officers (E7-E9), 1.2% warrant officer, 9.7% junior commissioned officers (O1-O3; Company Grade Officers), and 9.6% senior commissioned officers (O4-O6; Field Grade Officers). One hundred forty-nine veterans (62.6%) reported deployment experience, with 126 (55.0%) student veterans reporting combat experience in Iraq or Afghanistan, and 15 (6.1%) of student veterans reported non-combat deployments (e.g., Bosnia, Kosovo, Germany).

Procedure

All participants were required to be at least 18 years old, with current or past service in the military. Recruitment was conducted via referrals from college and university offices of military services, formal and informal campus-based veteran organizations, and referrals from fellow student veterans. The recruitment e-mail briefly introduced the study, the primary researcher, and included a link to a secure online website (via Qualtrics) for participation in the study. Once a veteran indicated interest in the study, they were directed to go online and read the full informed consent form, which explained all the procedures of the study, as well as the risks, benefits, and other pertinent

information. The survey site required participants to click a button indicating they had read the full consent form and agreed with the terms of the informed consent form before moving on to the initial online questionnaire. Participants could not access the questionnaire without clicking this button.

The initial survey took approximately one hour to complete. Participants who completed the first survey were contacted by e-mail approximately two months later requesting completion of a similar set of questionnaires, for a total of two separate surveys. Part two of the survey took approximately 30 minutes to complete. One hundred fifteen veterans participated in Time 2. To compare participants who only completed Time 1 with those who completed both Time 1 and Time 2, one-way ANOVAs were conducted for each of primary variables of interest from Time 1. No significant differences were detected for any of the variables: PTSD (F[1, 176] = 0.18, p = .676), depression (F[1, 197] = 0.44, p = .653), sleep problems (F[1, 176] = 0.04, p = .834), self-regulation (F[1, 197] = 0.00, p = .971), and PWB (F[1, 234] = 0.20, p = .510).

Participants were entered into a lottery for eight cash payments of $50. Participants earned one lottery entry for completion of part one and three entries for completion of part two. Participants were only excluded from this sample if they failed to provided adequate data for analysis (n = 62).

Measures

PTSD Symptoms. The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item, 5-point Likert scale on which respondents rank the severity

of their PTSD symptoms over the past month from 1 (*not at all*) to 5 (*extremely*). Each scale item is derived from a criterion symptom of PTSD as defined by the *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994). In this study, student veterans completed the military version of the PCL (PCL-M), which directs participants to respond to stressful military experiences. The scale has high internal consistency, test-retest reliability, and convergent and discriminant validity (Pratt, Brief, & Keane, 2006), and recent research has demonstrated adequate internal consistency of individual cluster scores (e.g., Renshaw & Caska, 2012). The scale authors recommended a cutoff score of 50 to indicate likely presence of PTSD (Weathers et al., 1993), but more recent research in a primary care setting indicated that a cutoff score of 34 maximized sensitivity and specificity for estimating diagnosis (Bliese et al., 2008). Internal consistency for the overall measure was strong in our sample of student veterans (Cronbach's $\alpha = .96$, Time 1; $\alpha = .96$, Time 2). The internal consistency for the four cluster subscales was strong in our sample, as well, with all Cronbach's αs > .90 at both time points.

Insomnia. Insomnia was assessed with the Insomnia Severity Index (ISI; Bastien et al., 2001). The ISI is a 7-item measure that focuses on quantitatively assessing sleep problems, and there is evidence indicating that the measure is reliable, valid, and sensitive to interventions designed to improve sleep (Ouellet et al., 2006). Prior research also demonstrates the validity of this scale with sleep diary assessments of insomnia symptoms (Bastien et al., 2001). Participants indicated the severity of sleep problems

during the past two weeks (e.g., "difficulty falling asleep" and "difficulty staying asleep") on a scale from 0 (*none*) to 4 (*very severe*), satisfaction with their current sleep pattern on a scale from 0 (*very satisfied*) to 4 (*very dissatisfied*), and the extent to which their sleep pattern interfered with daily functioning on a scale from 0 (*not at all/no sleep problem*) to 4 (*very much*). Due to a measure administration error, however, several participants only received the first four of the seven items. Thus, to maintain consistency across participants, a total insomnia severity score was created by taking the mean of the first four items for all participants. Internal consistency of this adapted measure was strong in our sample of student veterans (Cronbach's $\alpha = .86$, Time 1; $\alpha = .88$, Time 2).

Depression. Depression was assessed with the Depression subscale of the short form of the Depression Anxiety Stress Scales (DASS-D; Lovibond & Lovibond, 1995). The short form of the DASS-D consists of seven self-report items designed to measure the negative emotional state of depression. The seven items reflect symptoms of dysphoria, hopelessness, devaluation of life, self-depreciation, lack of interest or involvement, anhedonia, and inertia. Participants responded to items using a 4-point severity or frequency scale to rate the extent of their experience over the past week. The overall depression score is the sum of the seven items multiplied by two (to enable comparisons with the full 14-item version). The DASS-D has been shown to have high internal consistency and validity (Lovibond & Lovibond, 1995). Internal consistency was strong in our sample of student veterans (Cronbach's $\alpha = .93$, Time 1; $\alpha = .92$, Time 2).

Posttraumatic Growth. Posttraumatic growth was assessed using the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The PTGI has 21 questions focusing on posttraumatic growth in the context of relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Participants responded to each item on a 4-point scale regarding the extent of change that has occurred in the life following a traumatic experience. The overall posttraumatic growth score is the sum of responses to the 21 items. The PTGI has good internal consistency and construct, convergent, and discriminant validity (Tedeschi & Calhoun, 1996). Internal consistency was strong in our sample of student veterans (Cronbach's $\alpha = .93$, Time 1; $\alpha = .95$, Time 2).

Self-Regulation. Self-regulation was assessed using the 10-item self-regulation subscale of the Values In Action Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004). The items on the self-regulation subscale focus on individual regulations of feelings and behaviors, discipline, and emotional regulation, all of which are answered on a Likert scale from 1 (*Not like me*) to 5 (*Very much like me*). Example items include "I am a highly disciplined person" and "I control my emotions." Scores for self-regulation are calculated by summing the total responses. This VIA-IS subscale is reported to have adequate reliability and validity with satisfactory alphas (> .70) and test-retest correlations over a 4-month period (Peterson & Park, 2004). The total self-regulation score was created by summing the responses to the ten items. Internal consistency was strong in our sample of student veterans (Cronbach's $\alpha = .83$, Time 1; $\alpha = .80$, Time 2).

Hardiness. Hardiness was assessed using the 18-item Personal Views Survey III Revised (PVS III-R; Maddi et al., 2006). These 18 items assess individual hardiness using a 4-point Likert-type response format from 0 (*Not At All True*) to 3 (*Completely True*), across the three empirically related factors of hardiness: commitment (e.g., "I often wake up eager to take up life wherever it left off"), control (e.g., "When I make plans, I'm certain I can make them work"), and challenge (e.g., "Changes in routine provoke me to learn"). The PVS III-R is reported to have adequate reliability and validity (Maddi et al., 2006). The overall hardiness score is the sum of participants' responses to the 18 item. Internal consistency was strong in our sample of student veterans (Cronbach's α = .83, Time 1; α = .86, Time 2).

Psychological Well-Being. Psychological well-being was assessed using the Ryff's Scales of Psychological Well-Being (SPWB; Ryff & Keyes, 1995), which includes six subscales: Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, and Self-Acceptance. The combined measure contains 84 items assessed in a 6-point Likert-type response format from 1 (*Strongly disagree*) to 6 (*Strongly agree*). Example items include "I am not interested in activities that will expand my horizons" and "I feel good when I think of what I've done in the past and what I hope to do in the future." The SPWB score is a result of the sum total of all responses, with higher numbers indicating greater levels of PWB. Subscale scores for the specific domains can also be calculated in the same manner. Adequate reliability and validity are established for total score and subscale scores (Ryff & Keyes, 1995), with

more recent analyses suggesting less reliability for the highest and lowest levels of PWB while affirming reliability for average levels of PWB (Abbott, Ploubidis, Huppert, Kuh, & Croudace, 2010). Internal consistency of the overall measure was strong in our sample of student veterans (Cronbach's $\alpha = .97$, Time 1; $\alpha = .97$, Time 2). Strong internal consistency was also reflected in the subscales: Autonomy ($\alpha = .86$, Time 1; $\alpha = .88$, Time 2); Environmental Mastery ($\alpha = .92$, Time 1; $\alpha = .92$, Time 2); Personal Growth ($\alpha = .88$, Time 1; $\alpha = .91$, Time 2); Relationships with Others ($\alpha = .90$, Time 1; $\alpha = .92$, Time 2); Purpose in Life ($\alpha = .92$, Time 1; $\alpha = .93$, Time 2); and Self- Acceptance ($\alpha = .94$, Time 1; $\alpha = .94$, Time 2).

Data Analysis

Initial analyses consisted of scale reliability analyses, descriptives and intercorrelations for all measures. Bivariate correlations were used to evaluate hypothesis 1. Subsequently, structural equation modeling (SEM) was used to examine the distinctiveness of the six subscales of the SPWB, to determine whether each subscale should be analyzed separately, or whether they could be combined into an underlying latent variable. This was accomplished by testing a measurement model with data from each time point, with the six subscales of the SPWB (Autonomy, Environmental Mastery, Personal Growth, Relationships with Others, Purpose in Life, and Self-Acceptance) modeled as observed items loading onto a single latent variable (see Figures 1 and 2). Pending results of the measurement models, PWB was modeled in subsequent analyses as either a latent variable or six covarying observed variables.

Hypotheses 2-4 were then evaluated using SEM. To evaluate hypotheses 2 and 3, PCL-M score, DASS-D score, ISI score, and VIA-IS score were modeled as exogenous variables predicting PWB. Covariances were specified between error terms of all exogenous variables. To evaluate hypothesis 4, interaction terms between potential moderators (hardiness and self-regulation) and each of the other three predictors were added. Consistent with recommendations of Aiken and West (1991), data were modeled in the SEM by centering all predictor and moderator variables and creating interaction terms by multiplying these variables. All interactions were tested individually to preserve power and reduce overlap in the exogenous variables. Although this increased the number of models tested, it allowed for clearer and more powerful tests of moderation. Any significant interactions were probed by creating high and low level (± 1 *SD*) versions of the relevant moderating variable (see Aiken & West, 1991) and re-running the model to examine the change in path estimate for the relationship in question. All analyses were conducted both cross-sectionally (at both time points) and longitudinally (with risk/protective factors at Time 1 predicting PWB outcomes at Time 2).

To evaluate the distinctiveness of using PWB, compared to PTG, as an outcome, we subsequently reran all structural equation models with the score on the PTGI as the outcome. These results are reported in Appendix A.

Finally, to address the exploratory aim of examining associations of specific PTSD symptom clusters with PWB, we ran an additional SEM in which the exogenous

variables were the four symptom clusters scores from the PCL-M score (centered), again with covariances allowed between error terms of all exogenous variables, with PWB as the endogenous variable. Again, all analyses were conducted both cross-sectionally (at both time points) and longitudinally.

In interpreting model fit, we examined the root mean square error of approximation (RMSEA), comparative fit index (CFI), and normed fit index (NFI). Various authors have recommended RMSEA values of .08, .06, or .05 and lower, and CFI and NFI values of .90 or .95 and higher, as indicative of good fit (e.g. Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004). All path analyses were conducted in Amos 19.0.

Results

Initial Analyses

Descriptive information for all variables of interest is presented in Table 1. The analysis of PCL-M, DASS-D, and ISI means scores indicates moderate levels of distress. Consistent with these mean scores, on the PCL-M, 21.4% of student veterans at Time 1 and 12.9% of veterans at Time 2 met or exceeded the clinical cutoff of 50 that was recommended by Weathers and colleagues (1993), with 39.4% and 24.6% meeting or exceeding the cutoff of 34 suggested by Bliese and colleagues (2008) at Time 1 and 2, respectively.

Bivariate correlations among the variables of interest within and across both time points are shown in Tables 2 and 3. Bivariate correlations of hardiness with PWB at both Time 1 and Time 2 were very high. Hardiness was initially hypothesized as a moderator, but this extremely high association with PWB would have resulted in most of the variance in the outcome variable being accounted for by the main effect of hardiness. Thus, hardiness was dropped from further analyses. Self-regulation, the remaining hypothesized moderator, had a medium to high correlation with PWB at both time points. As expected, PWB was strongly correlated with depression, sleep problems, and PTSD at both time points. The significant, negative correlation of PTSD scores with PWB scores

within and across both time points confirmed the first hypothesis that PTSD symptoms would have a significant negative association with psychological well-being.

Measurement Model

SEM was used to test a measurement model examining the distinctiveness of the six subscales of the SPWB at both time points. The measurement model was created by modeling a single latent variable with paths to each of the six subscales of the SPWB (Autonomy, Environmental Mastery, Personal Growth, Relationships with Others, Purpose in Life, and Self-Acceptance), modeled as observed variables (see Figures 1 and 2). This model provided an adequate fit for the data at Time 1 ($\chi^2[9] = 26.53$, $p < .001$; NFI = .98; CFI = .98; RMSEA = .09) and at Time 2 ($\chi^2[9] = 30.80$, $p < .001$; NFI = .95; CFI = .96; RMSEA = .10). As such, the six observed variables were modeled as one underlying latent variable in all subsequent analyses.

Hypotheses 2 and 3: Main Effects on PWB

Time 1 cross-sectional model. The first model examined the simultaneous associations of PTSD, depression, sleep problems, and self-regulation at Time 1 with the latent variable representing PWB at Time 1 (see Figure 3). This model provided an adequate fit for the data ($\chi^2[29] = 105.28$, $p < .001$; NFI = .93; CFI = .95; RMSEA = .11). As shown in Figure 3, higher levels of PWB were significantly associated with lower levels of PTSD and depression and higher levels of self-regulation. Of note, the coefficient for the association of depression with PWB was five times larger than the coefficient representing the association of PTSD with PWB. Furthermore, relative to the

bivariate correlations at Time 1, the coefficient for depression was reduced by less than 20%, whereas the coefficient for PTSD was reduced by more than 75%. This pattern suggests that depression accounts for substantially more variance in PWB than does PTSD. Sleep problems were not significantly associated with PWB.

Time 2 cross-sectional model. The second model examined the associations of PTSD, depression, sleep problems, and self-regulation at Time 2 with the latent variable representing PWB at Time 2 (see Figure 4). This model provided an adequate fit for the data ($\chi^2[29] = 78.02$, $p < .001$; NFI = .91; CFI = .94; RMSEA = .08). As shown in Figure 4, higher levels of PWB were significantly associated with lower levels of PTSD, depression, and sleep problems, and with higher levels of self-regulation. Of note, the coefficient for the association of depression with PWB was almost three times larger than the coefficient representing the association of PTSD with PWB. Furthermore, relative to the bivariate correlations at Time 2, the coefficient for depression was reduced by less than 40%, whereas the coefficient for PTSD was reduced by more than 70%. This pattern suggests that depression accounts for substantially more variance in PWB than does PTSD.

Longitudinal model. The third model examined the associations of PTSD, depression, sleep problems, and self-regulation at Time 1 with the latent variable representing PWB at Time 2 (see Figure 5). This model provided an adequate fit for the data ($\chi^2[29] = 68.57$, $p < .001$; NFI = .92; CFI = .95; RMSEA = .08). As shown in Figure 5, higher levels of PWB were significantly associated with lower levels of depression and

higher levels of self-regulation. Of note, the coefficient for the association of depression with PWB was more than twice as large as the coefficient representing the association of PTSD with PWB. Furthermore, relative to the bivariate correlations across time points, the coefficient for depression was reduced by less than 40%, whereas the coefficient for PTSD was reduced by more than 70%. This pattern suggests that depression accounts for substantially more variance in PWB than does PTSD. PTSD and sleep problems were not significantly associated with PWB.

Summary. All three models found that higher levels of PWB were significantly associated with lower levels of depression and higher levels of self-regulation. PTSD was also significantly, negatively associated with PWB in cross-sectional models, but not the longitudinal model. In contrast, sleep was only significantly associated with PWB in one of the two cross-sectional models.

In every model, depression and self-regulation had a substantially larger path coefficient than PTSD (see Figures 3-5), and the standardized coefficient for the path from PTSD to PWB was substantially lower than the bivariate correlation of PTSD with PWB. This pattern of findings is consistent with the notion that depression accounts for some of the association of PTSD with PWB, as hypothesized (hypothesis 2). In contrast, although sleep problems had a high bivariate correlation with PWB, it was only significant in one of the three multivariate models, and path coefficients were small in all models. Thus, contrary to hypothesis 2, there is less compelling evidence that sleep problems account for some of the variance in PWB beyond PTSD. With respect to the

third hypothesis, results from every model indicated that self-regulation had a significant positive association with psychological well-being, even when controlling for the effects of PTSD, sleep problems, and depression.

Hypothesis 4

Time 1 cross-sectional model. To evaluate the hypothesis that self-regulation would moderate the associations of PTSD, depression, and sleep problems with PWB, an interaction term was added as an observed, exogenous variable to the models described above (see Figure 6). Each interaction was tested in a separate model to preserve power and reduce multicollinearity. The interaction terms were between self-regulation and each of the other predictor variables. This resulted in three additional models: one with an interaction between self-regulation and PTSD, one with an interaction between self-regulation and depression, and one with an interaction between self-regulation and sleep problems. Using cross-sectional data from Time 1, each of the three models provided an adequate fit for the data, but in each one, the interaction term was non-significantly associated with PWB, indicating no moderation of any main effects by self-regulation (see Table 4).

Time 2 cross-sectional model. Each of the three models with interactions of Time 2 variables predicting PWB at Time 2 again provided an adequate fit for the data. Again, however, in each one, the interaction term was non-significantly associated with PWB, indicating no moderation of any main effects by self-regulation (see Table 4).

Longitudinal model. Each of the three models with the interactions of Time 1

variables predicting PWB at Time 2 also provided an adequate fit for the data (see Table 4). In two of the three longitudinal models, the interaction term was significant (see Table 4): the interaction of self-regulation with PTSD and the interaction of self-regulation with depression. Thus, veterans' reported self-regulation at time one moderated the associations of their PTSD and depression symptoms at Time 1 with their levels of PWB at Time 2. As such, these two interactions were probed.

Contrary to expectations, the probe of the interaction of self-regulation and depression revealed that the negative association of depression with PWB was stronger at higher (+1 *SD*) levels of self-regulation (b = -.56, $p < .001$) than at lower levels (-1 *SD*) of self-regulation (b = -.21, $p < .05$). The probe of the interaction of self-regulation and PTSD revealed a similar pattern, such that the negative association of PTSD was also stronger at higher (+1 *SD*) levels of self-regulation (b = -.34 $p < .01$), with a non-significant association at lower levels (-1 *SD*) of self-regulation (b = -.05, $p = .690$).

Summary. All cross-section models resulted in non-significant interaction terms. In contrast, the longitudinal models revealed two of three significant interaction terms, suggesting that self-regulation moderated the longitudinal association of both PTSD and depression with PWB. Contrary to our hypotheses, however, probing of the interaction of self-regulation and PTSD revealed that the negative associations of both PTSD and depressive symptoms with PWB grew *stronger* as levels of self-regulation increased.

Exploratory Analyses: PTSD Clusters and PWB

Time 1 cross-sectional model. The model examining the associations of each

cluster of PTSD (re-experiencing, avoidance, numbing/withdrawal, and hypervigilance) at Time 1 with PWB at Time 1 provided a marginal to adequate fit for the data ($\chi^2[20] = 82.48$, $p < .001$; NFI = .95; CFI = .96; RMSEA = .12). As shown in Figure 7, higher levels of PWB were significantly associated with lower levels of the numbing/withdrawal cluster. Re-experiencing, avoidance, and hypervigilance clusters were not significantly associated with PWB.

Time 2 cross-sectional model. The model examining the associations of each cluster of PTSD (re-experiencing, avoidance, numbing/withdrawal, and hypervigilance) at Time 2 with PWB at Time 2 provided an adequate fit for the data ($\chi^2[20] = 53.78$, $p < .001$; NFI = .95; CFI = .97; RMSEA = .08). Once again, higher levels of PWB were significantly associated with lower levels of the numbing/withdrawal cluster (see Figure 8). Re-experiencing, avoidance, and hypervigilance clusters were not significantly associated with PWB.

Longitudinal model. The model examining the associations of each cluster of PTSD (re-experiencing, avoidance, numbing/withdrawal, and hypervigilance) at Time 1 with PWB at Time 2 provided an adequate fit for the data ($\chi^2[20] = 48.75$, $p < .001$; NFI = .96; CFI = .97; RMSEA = .08). Again, higher levels of PWB were significantly associated with lower levels of the numbing/withdrawal cluster (see Figure 9). Re-experiencing, avoidance, and hypervigilance clusters were not significantly associated with PWB.

Summary. All three models examining the simultaneous associations of each

cluster of PTSD (re-experiencing, avoidance, numbing/withdrawal, and hypervigilance) with PWB confirmed a significant negative association for the numbing/withdrawal cluster and non-significant associations for re-experiencing, avoidance, and hypervigilance.

Discussion

The purpose of this study was to empirically investigate a broader model of risk and resilience with regard to the positive outcome of psychological well-being (PWB) in a sample of veterans who served during the recent wars in Iraq and Afghanistan, using data from two time points. As prior research with this population has focused almost entirely on PTSD (e.g., Vasterling, Daly, & Friedman, 2011), this proposed model reflects a more holistic consideration of other known risk factors (depression and sleep problems) and a hypothesized protective factor (self-regulation). Self-regulation was selected for examination in this particular population, as prior research has identified the related construct of self-discipline as a valued legacy of military service (Aldwin et al., 1994). Given its positive association with higher levels of psychological well-being and lower levels of depression and anxiety (Tangney et al., 2004), it was thought that self-regulation might be a particular salient protective factor for veterans.

Consistent with prior research (e.g., Sayers et al., 2009; Taft et al., 2011; Vasterling et al., 2010), bivariate associations in this sample confirmed the negative association of PWB with PTSD symptoms and other mental health problems, both cross-sectionally and longitudinally. The effect sizes were large, suggesting a very strong association among these variables. Multivariate results from this study, however, suggest

that a broader model that extends beyond PTSD as the primary risk factor for poorer well-being is warranted.

SEM analysis revealed that both depression and PTSD were negatively associated with PWB when evaluated simultaneously, but the association of depression with PWB was substantially stronger than that of PTSD. Indeed, when examined longitudinally, PTSD symptoms failed to even achieve significance as a predictor of PWB when depression was also included. This pattern of findings is congruent with studies of health-related QOL, which have often revealed that depression accounts for more variance in QOL than PTSD (Gudmundsdottir, Beck, Coffey, Miller, & Palyo, 2004; Ikin, Creamer, Sim, & McKenzie, 2010; Pittman et al., 2011). This pattern was further reinforced by the analysis of PTSD symptom clusters and PWB. In those analyses, only the numbing/withdrawal symptoms, which have a strong overlap with symptoms of depression, were significantly related to PWB across all analyses. In contrast, symptoms specifically related to re-experiencing traumatic memories, avoidance of traumatic reminders, or hypervigilance were not significantly associated with PWB when accounting for withdrawal/numbing.

For service members struggling with PTSD, these findings highlight the significance of the numbing/withdrawal symptoms and comorbid depression that often accompany PTSD. It appears that these types of withdrawal behaviors appear to be most problematic for and account for the greatest threat to overall PWB. Clinically, these findings suggest that, although PTSD is important in understanding overall functioning in

this population, we cannot limit our attention to just PTSD. Indeed, depressive symptoms appear to play a greater role in explaining a lack of positive outcomes in this population. As such, the importance of assessment and diagnosis of depression and depressive symptoms is noted both for clinical treatment planning as well as research on functioning in this population. With regard to treatment, these findings suggest that treatment planning for military veterans should not simply be thought of in terms of PTSD only. Rather, behavioral activation, thought challenging, and other evidence-based mechanisms of change to reduce withdrawal behaviors and depressive symptoms (e.g., Jacobson et al., 1996) irrespective of traumatic memories may be needed.

With regard to sleep problems, adding this variable to the prediction of PWB only resulted in significance in a third of the models considered. Thus, the evidence for including sleep problems in a broader model is less strong than the evidence for including depression. An important consideration with respect to these findings, however, is that a problem with administration of measures led to the use of only an abbreviated version of the ISI (based on the first four items instead of the entire seven items). Thus, it is difficult to definitively comment on the importance of sleep problems in a larger model without future research that attempts to replicate these findings.

In addition to expanding the examination of risk factors for decreased well-being in this population, we sought to investigate protective factors that might be particularly relevant to a military population. As self-regulation is analogous with self-discipline, a unique characteristic in the military population (Aldwin et al., 1994), it was examined as

a hypothesized protective factor. Prior research has demonstrated the positive association of self-regulation with higher levels of psychological well-being and lower levels of depression and anxiety (Tangney et al., 2004), and in our sample, self-regulation exhibited a significant, positive main effect on PWB in all models evaluated. Thus, higher levels of self-regulation are associated with higher PWB, even when mental health problems are present. This positive main effect of self-regulation has potential importance, given that military experience has the potential to increase one's self-regulation. This is highlighted in the Department of the Army's Training and Doctrine Command's (TRADOC) stated Initial Military Training guidance, which is to transform a civilian into a Soldier through the "deliberate moral/ethical, physical, and psychological development/progression of a civilian into a Soldier and a member of the Army Profession, who lives the Army Values and demonstrates an appropriate level of commitment, discipline, task proficiency, adherence to the Army ethic and motivated to become a Professional Soldier" (Department of the Army, 2012, p. 14). Moreover, this process of learning, living, and demonstrating an appropriate level of self-regulation continues throughout the individual soldier's military experience. Thus, the combination of initial entry military training and the military experience might already offset the potential for the psychological impact of combat exposure by increasing self-regulation, even in the face of PTSD symptoms, sleep problems, and depression.

Despite this positive main effect, an unpredicted interactive effect emerged in the longitudinal analysis of protective and risk factors predicting PWB. Although we

anticipated that higher levels of self-regulation might attenuate the association of mental health symptoms with PWB, the opposite pattern was obtained. Instead of attenuating the association of mental health problems with PWB, higher levels of self-regulation appeared to *enhance* the associations of both PTSD and depression with PWB. As this is the first examination of this type, and the finding was only present in the longitudinal models, replication of this finding is needed. If the pattern is replicated, however, one possible explanation for these unanticipated outcomes is that very high scores on the measure of self-regulation may actually tap into excessive controlling behaviors. In veterans with elevated PTSD or depressive symptoms, excessively high scores on the measures of self-regulation could reflect attempts to control or even hide PTSD or depressive symptoms. As such, these controlling behaviors could, in turn, increase the degree to which PTSD and depressive symptoms are negatively linked with future PWB. If this were the case, it could have significant implications. Specifically, initial entry military training is designed to transform a civilian into a service member. The intended result of initial entry training and the follow-on military experience is a *mentalkevlar* serving as a protective factor when exposed to trauma. The ultimate goal of this process is a well-balanced professional, demonstrating character and competence. However, one possible interpretation of our results is that, although a well-rounded sense of self-regulation is protective, an excessive level of self-regulation may be a risk factor with regard to later PWB. This notion of achieving the ideal degree of *mentalkevlar* should be

explored in future examinations of a broader model of risk and protective factors in the veterans of Iraq and Afghanistan, both cross-sectionally and longitudinally.

As with any research, there are limitations of this study. First, the sample was recruited through colleges and universities. Perhaps there is something unique about student veterans with respect to their resilience process resulting in the pursuit of learning that differentiates them from non-student veterans. This limitation could be addressed by replicating this study in a sample of veterans who are not pursing their education but have transitioned directly to the civilian workforce. Second, survey recruitment and completion were entirely online, resulting in decreased ability to monitor who was actually participating or the sincerity of their participation. Also, the study was based entirely on self-report measures, which allows for many biases (e.g., recall bias, social desirability) at each time point. As noted, there were additional difficulties with the administration of the measure of sleep problems. This study is further limited by assumptions related to military training and experience. In particular, self-discipline is assumed to map onto self-regulation; however, it is possible that self-regulation does not adequately capture this valued legacy of military service. Moreover, this study did not include a non-military control group, to better determine whether veterans exhibit greater self-regulation (i.e., *mentalkevlar*) as a protective factor, compared to a civilian sample. In addition, the focus on outcomes was limited to PWB as defined by Ryff's (1989) model. Future examination of PWB may result in different outcomes when PWB is characterized in a different manner. Finally, as no study to date has directly examined

PWB in this population or a broader model of risk and protective factors, future research is needed to determine whether these findings replicate.

Conclusion

Overall, our findings support the need for examining a broader model of risk and protective factors predictive of outcomes in veterans who served during the recent era of wars in Iraq and Afghanistan. The present empirical investigation of PTSD, sleep problems, depression, and self-regulation in this unique sample of veterans moves the research literature in the direction of achieving such a model and paves the way for further prospective research of this type. The significance of a potential legacy of military service (self-regulation) demonstrates the importance of considering individual strengths potentially related to military training and prevention efforts. Moreover, the significant findings related to depression in addition to PTSD symptoms highlight the need to consider risk factors beyond PTSD in this population.

Achieving a better understanding of a service member's *mentalkevlar*, as a result of their military training and experience, could pave the way to a better understanding of resiliency processes unique to the military culture. This study's examination of self-regulation sets in motion a call for examining the protective impact of other valued legacies of military service. As other protective factors are identified and incorporated into a broader model, they can be assessed as future military recruits are considered for initial entry into the armed forces. Then, as these recruits progress through their initial

entry training, future programs of instruction can be designed to ensure the instruction intentionally enhances these protective characteristics. Ultimately, this will lead to a better understanding of the mechanisms by which a service member's military experience associates with positive outcomes even in the face of traumatic experiences.

Table 1

Descriptive Information for Variables of Interest at Both Time Points

	Time 1		Time 2	
	M	*SD*	*M*	*SD*
1. PCL-M	38.70	18.28	37.41	18.29
2. DASS-D	11.62	5.25	11.76	5.15
3. ISI	9.69	4.19	9.91	4.23
4. VIA-IS	74.76	7.48	73.97	6.76
5. PVS III-R	43.68	7.75	42.84	8.17
6. SPWB	372.31	67.49	369.20	68.57

Note. PCL-M = PTSD Checklist – Military Version; DASS-D = Depression Anxiety Stress Scale – Depression subscale; ISI = Insomnia Severity Index; VIA-IS = Values In Action – Inventory of Strengths, Self-Regulation subscale; PVS III-R = Personal Value Survey III – Revised; SPWB = Scales of Psychological Well-Being.

Table 2

Cross-sectional Bivariate Correlations Among Variables of Interest at Both Time Points

	1	2	3	4	5	6
1. PCL-M	-	.55***	.64***	-.10	-.48***	-.56***
2. DASS-D	.55***	-	.56***	-.39***	-.63***	-.71***
3. ISI	.67***	.53***	-	-.09	-.52***	-.54***
4. VIA-IS	-.11	-.29***	-.04	-	.41***	.42***
5. PVS III-R	-.39***	-.63***	-.34***	.44***	-	.83***
6. SPWB	-.50***	-.74***	-.43***	.46***	.77***	-

Note. Correlations among variables at time 1 shown below the diagonal; correlations among variables at time 2 shown above the diagonal. PCL-M = PTSD Checklist – Military Version; DASS-D = Depression Anxiety Stress Scale – Depression subscale; ISI = Insomnia Severity Index; VIA-IS = Values In Action – Inventory of Strengths, Self-Regulation subscale; PVS III-R = Personal Value Survey III – Revised; SPWB = Scales of Psychological Well-Being.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Bivariate Correlations Among Variables of Interest Across Both Time Points

	T2 PCL-M	T2 DASS-D	T2 ISI	T2 VIA-IS	T2 PVS III-R	T2 SPWB
T1 PCL-M	.87***	.50***	.68***	-.13	-.46***	-.51***
T1 DASS-D	.57***	.57***	.60***	-.13	-.50***	-.54***
T1 ISI	.61***	.50***	.84***	-.03	-.49***	-.47***
T1 VIA-IS	-.04	-.24*	-.02	.74***	.22***	.28**
T1 PVS III-R	-.45***	-.63***	-.47***	.37***	.76***	.83***
T1 SPWB	-.57***	-.60***	-.56***	.34***	.67***	.84***

Note. T1 = Time 1; T2 = Time 2; PCL-M = PTSD Checklist – Military Version; DASS-D = Depression Anxiety Stress Scale – Depression subscale; ISI = Insomnia Severity Index; VIA-IS = Values In Action – Inventory of Strengths, Self-Regulation subscale; PVS III-R = Personal Value Survey III – Revised; SPWB = Scales of Psychological Well-Being.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Interaction of Self-Regulation with Depression and PTSD Cross-sectionally and Longitudinally

	Model Fit Indices				Interaction Coefficient
	χ^2 (34)	NFI	CFI	RMSEA	*b*
1. IX VIA-IS & PCL-M (T1)	119.05	.93	.95	.10	-.02
2. IX VIA-IS & DASS-D (T1)	111.79	.93	.95	.10	-.00
3. IX VIA-IS & ISI (T1)	107.02	.93	.95	.10	-.02
4. IX VIA-IS & PCL-M (T2)	86.21	.90	.93	.08	-.04
5. IX VIA-IS & DASS-D (T2)	80.27	.91	.94	.08	-.06
6. IX VIA-IS & ISI (T2)	80.09	.91	.94	.08	-.04
7. IX VIA-IS & PCL-M (L)	72.44	.92	.95	.07	-.16*
8. IX VIA-IS & DASS-D (L)	74.15	.92	.95	.07	-.19**
9. IX VIA-IS & ISI (L)	71.33	.92	.95	.07	-.12

Note. IX = Interaction; PCL-M = PTSD Checklist – Military Version; DASS-D = Depression Anxiety Stress Scale – Depression subscale; ISI = Insomnia Severity Index; VIA-IS = Values In Action – Inventory of Strengths, Self-Regulation subscale; T1 = Time 1 Cross-sectional model; T2 = Time 2 Cross-sectional model; L = Longitudinal model.

* $p < .05$. ** $p < .01$. *** $p < .001$.

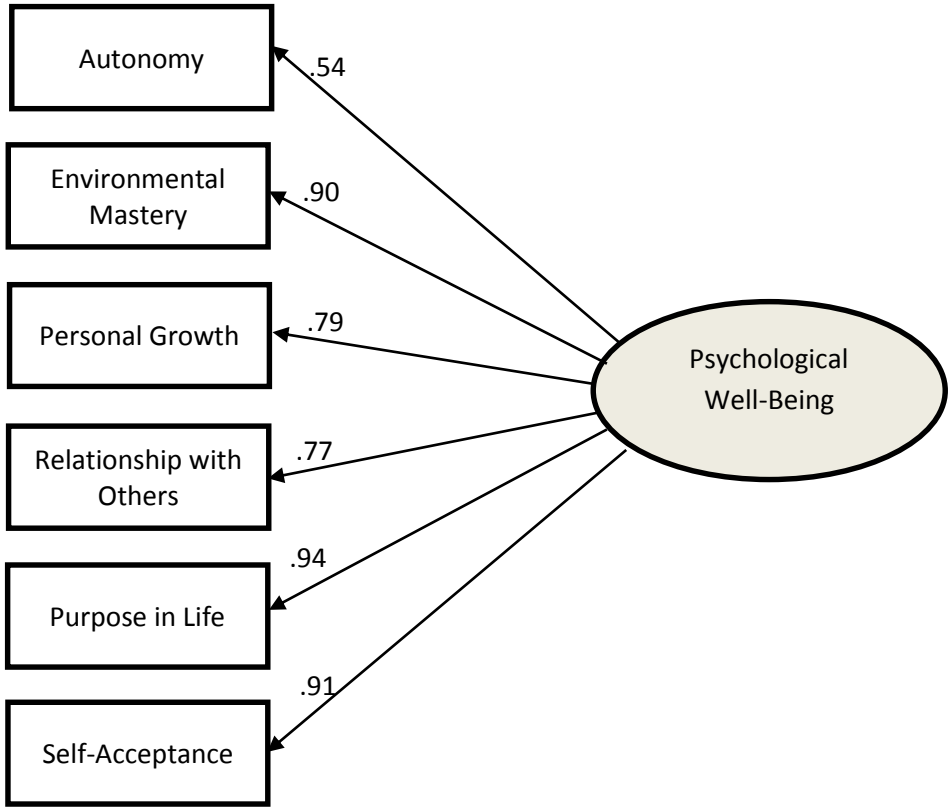

Figure 1. Measurement model examining psychological well-being as a latent variable, at Time 1, with standardized path estimates shown.

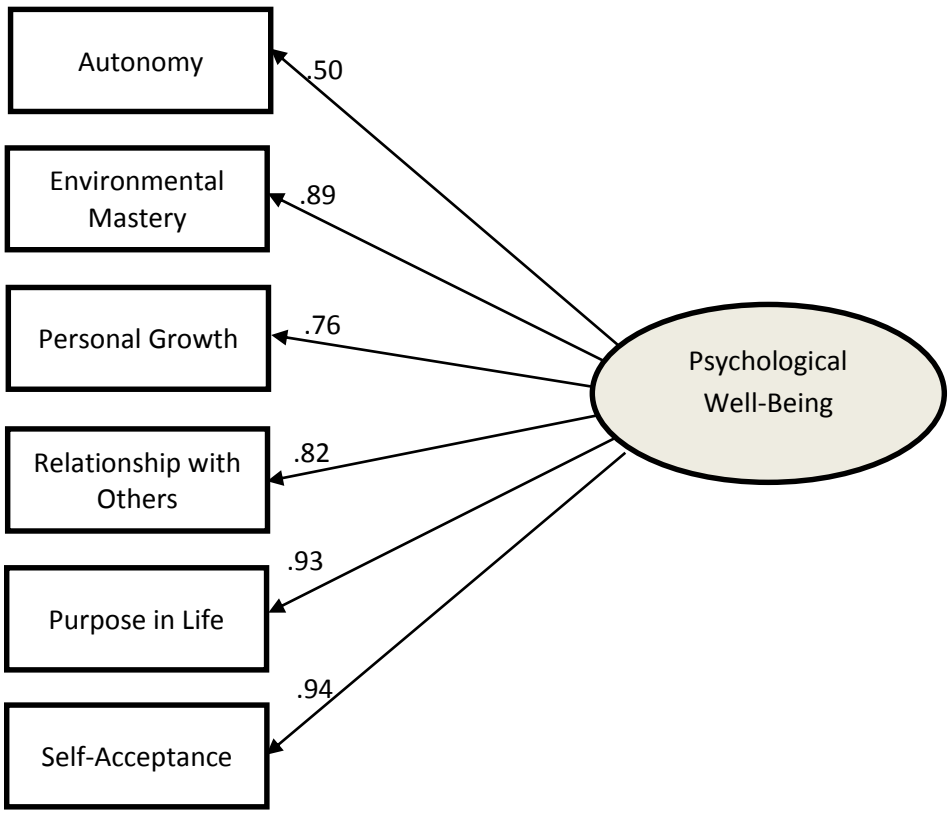

Figure 2. Measurement model examining psychological well-being as a latent variable, at Time 2, with standardized path estimates shown.

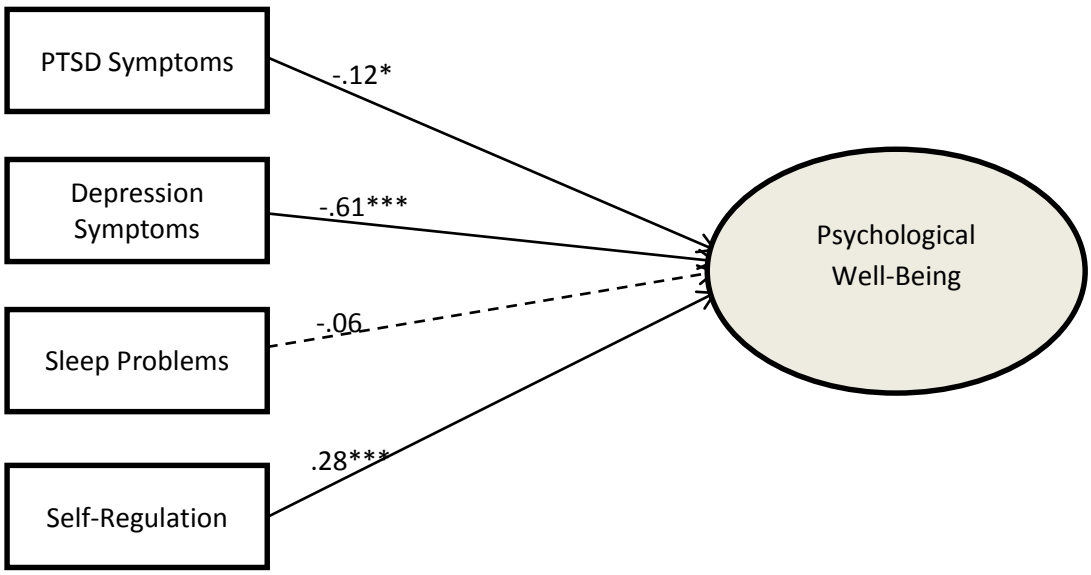

Figure 3. Structural equation model examining cross-sectional model at Time 1, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

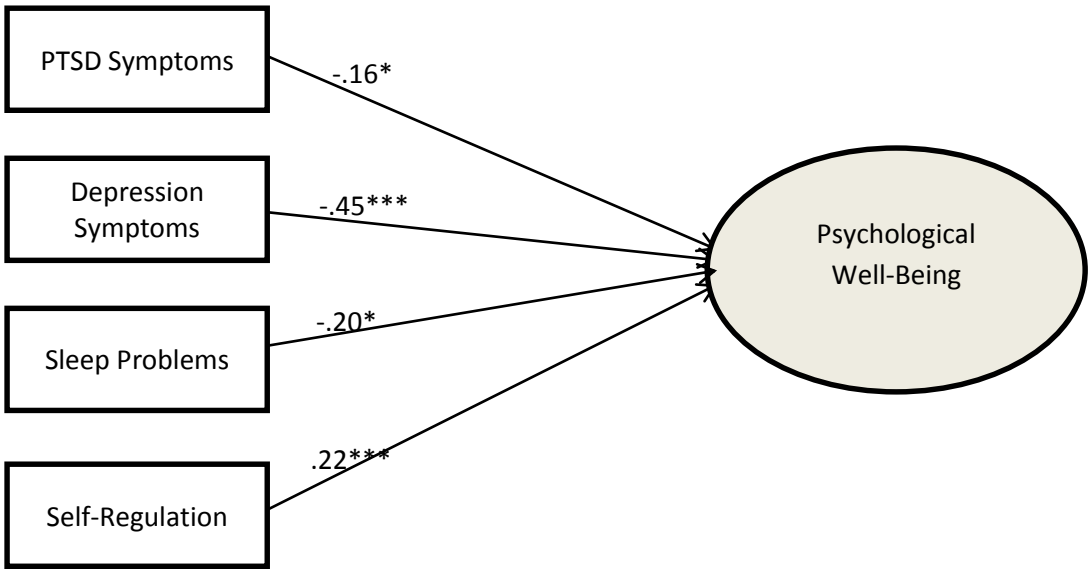

Figure 4. Structural equation model examining cross-sectional model at Time 2, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

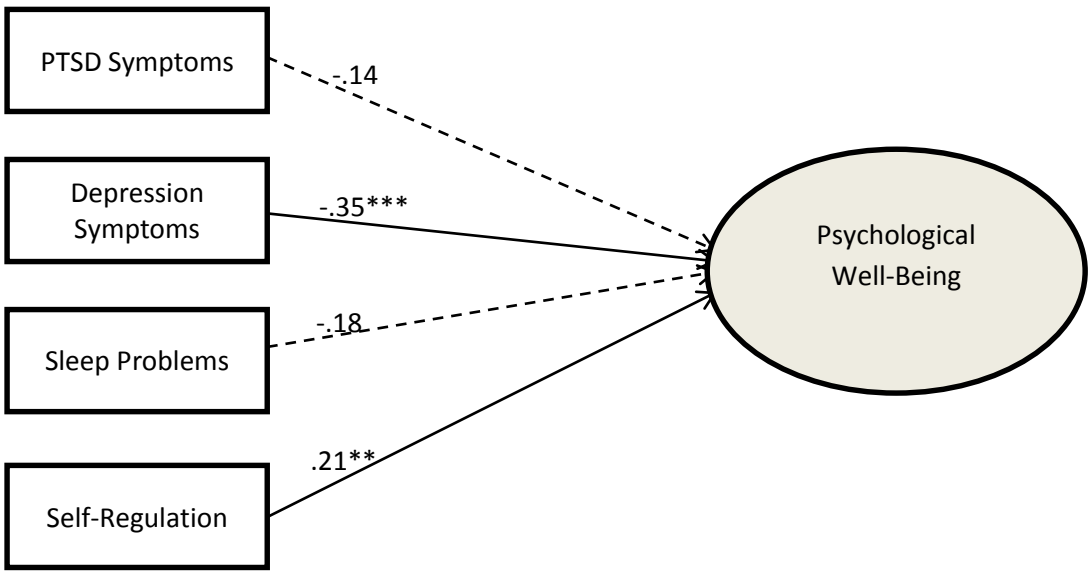

Figure 5. Structural equation model examining the longitudinal model, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

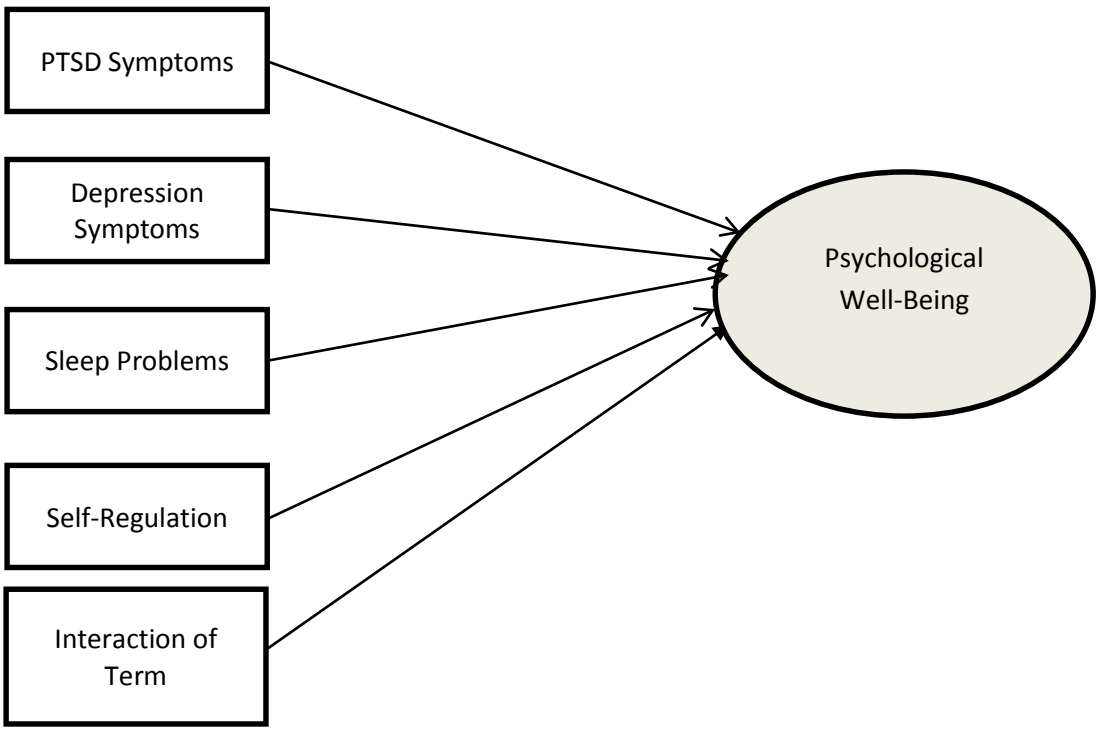

Figure 6. Structural equation model including interaction term to examine moderation by self-regulation. Covariances not shown. PTSD = posttraumatic stress disorder.

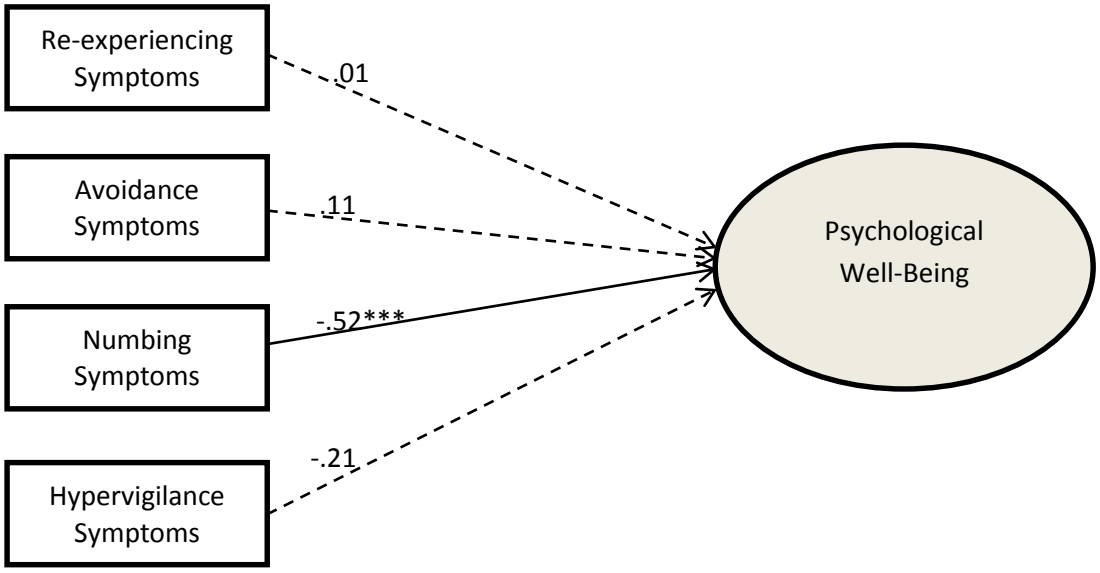

Figure 7. Structural equation model examining the PTSD cluster cross-sectional model at Time 1, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

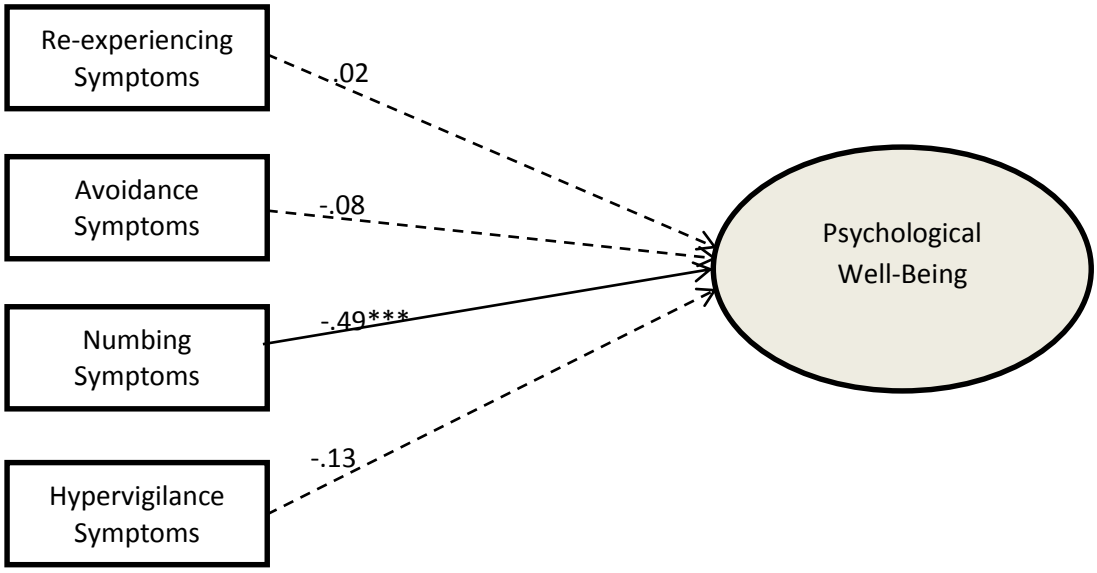

Figure 8. Structural equation model examining the PTSD cluster cross-sectional model at Time 2, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

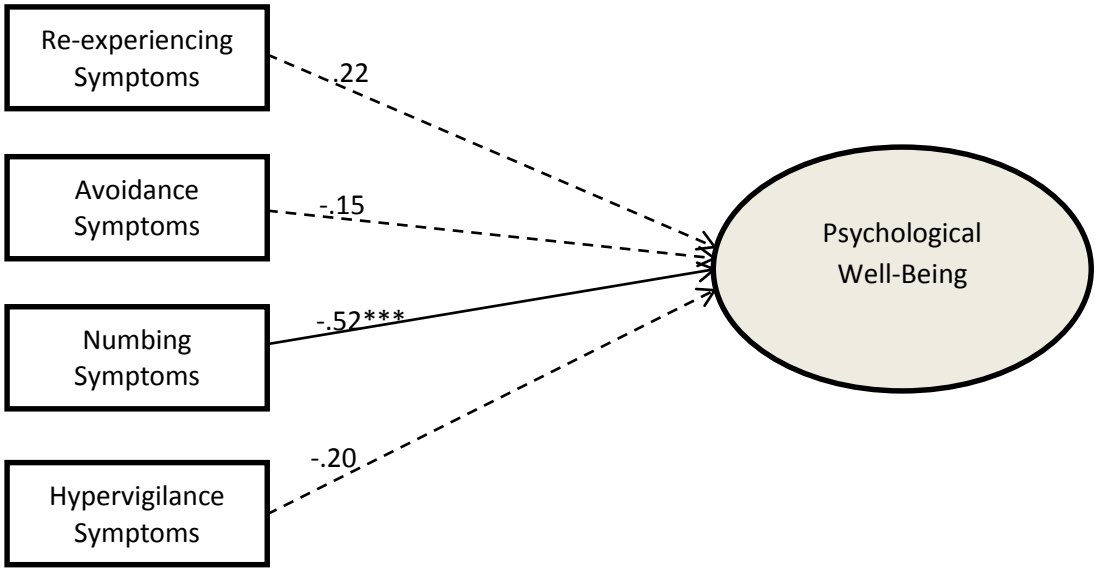

Figure 9. Structural equation model examining the PTSD cluster longitudinal model, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Appendix A

Modeling Posttraumatic Growth (PTG) as the Outcome Variable instead of PWB

From the literature review, PTG captures some of what is measured by PWB (i.e. Purpose in Life and Personal Growth). To explore the distinctiveness of these variables, we first evaluated their bivariate correlation within and across both time points. Subsequently, we replicated the analyses predicting PWB at both time points and across time points with PTG as the outcome variable of interest, to determine the similarity of associations of risk and protective factors with these two potentially related outcomes.

Bivariate Correlations

The correlation of PWB and PTG at Time 1 (r = .34, p > .001), Time 2 (r = .23, p > .05), and across time points (r = .19, p= .066) all ranged in small-medium size. Of note, their relationship was non-significant across time points. The small to medium size of the correlation suggests they are not strongly related.

Analyses with PTG as Outcome

Because PTG was modeled as an observed variable, the analyses were fully saturated. Thus, model fit indices were not generated, but estimates of path coefficients were. Results for each model are described below.

Time 1 cross-sectional model. Results of the model examining the associations

of PTSD, depression, sleep problems, and self-regulation at Time 1 with PTG at Time 1 are shown in Figure A-1. Higher levels of PTG were significantly associated with lower levels of depression and higher levels of self-regulation. Of note, the coefficient for the association of depression with PWB was five times larger than the coefficient representing the association of PTSD with PWB whereas the coefficient for the association of depression with PTG was 18 times larger than the coefficient representing the association of PTSD with PTG. PTSD symptoms and sleep problems were not significantly associated with PTG.

Time 2 cross-sectional model. Results of the model examining the associations of PTSD, depression, sleep problems, and self-regulation at Time 2 with PTG at Time 2 are shown in Figure A-2. Of note, the coefficient for the association of depression with PWB was almost three times larger than the coefficient representing the association of PTSD with PWB whereas the coefficient for the association of depression with PTG was two times larger than the coefficient representing the association of PTSD with PTG. None of the observed variables were significantly associated with PTG.

Longitudinal model. Results of the model examining the associations of PTSD, depression, sleep problems, and self-regulation at Time 1 with PTG at Time 2 are shown in Figure A-3. Higher levels of PTG were significantly associated with lower levels of depression. Of note, the coefficient for the association of depression with PWB was more than twice as large as the coefficient representing the association of PTSD with PWB whereas the coefficient for the association of depression with PTG was one and a

half times larger than the coefficient representing the association of PTSD with PTG. PTSD symptoms, sleep problems, and self-regulation were not significantly associated with PTG.

Conclusion

Based on the results of the correlations and structural equation models, PTG appears to be distinct from PWB in this sample. Findings regarding PTG may be worth examining in future analyses of this sample.

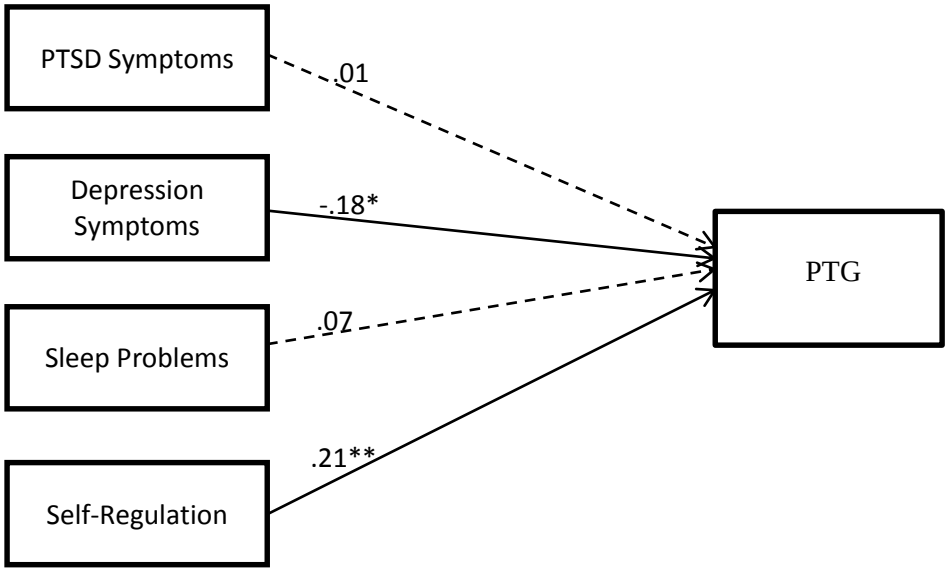

Figure A-1. Structural equation model examining cross-sectional model of PTG at Time 1, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder; PTG = posttraumatic growth.

* $p < .05$. ** $p < .01$. *** $p < .001$.

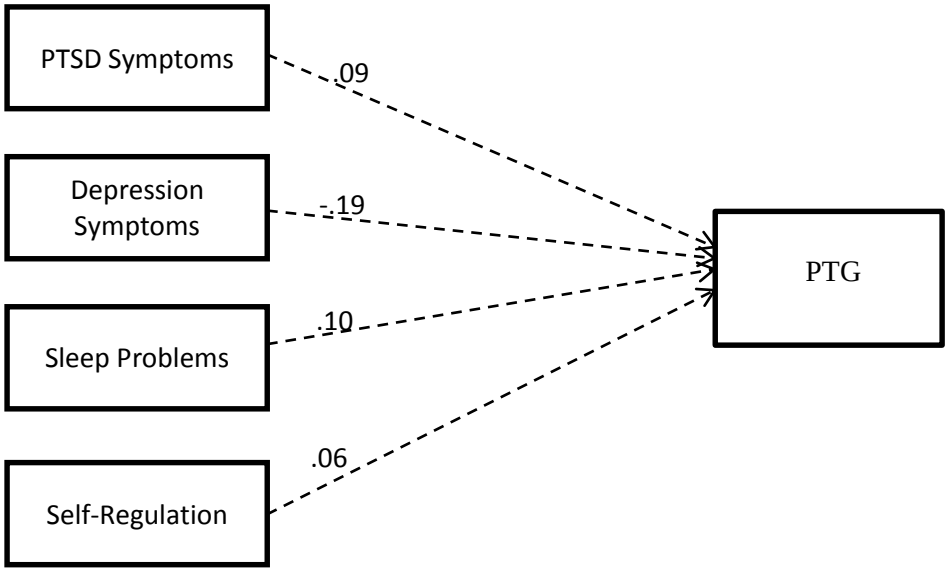

Figure A-2. Structural equation model examining cross-sectional model of PTG at Time 2, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder; PTG = posttraumatic growth.

* $p < .05$. ** $p < .01$. *** $p < .001$.

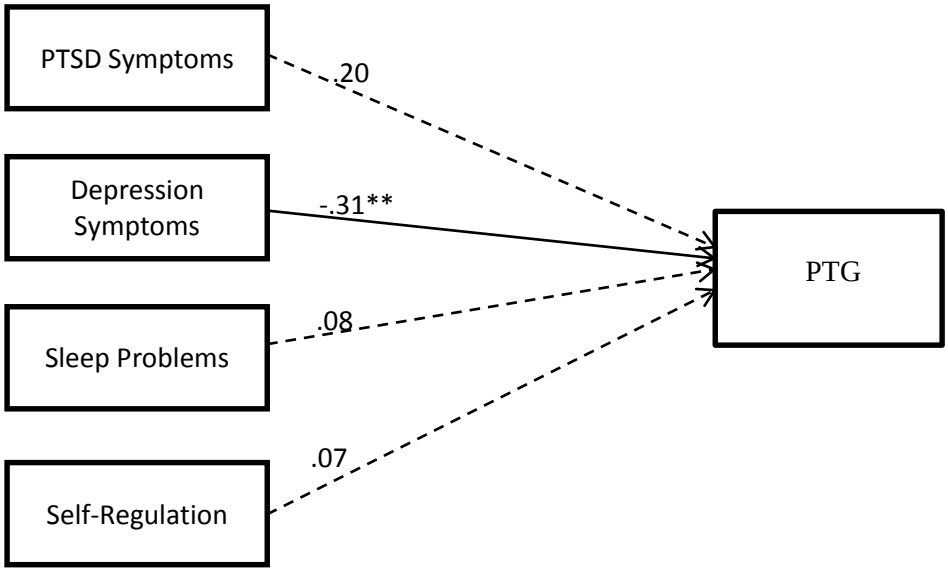

Figure A-3. Structural equation model examining PTG longitudinally, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder; PTG = posttraumatic growth.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Appendix B

Modeling PWB with the Addition of Social Support

Social support has been demonstrated to play a significant role in positive outcomes in a number of prior studies (see meta-analysis by Wright, Kelsall, Sim, Clarke, & Creamer, 2013). As such, we sought to determine whether the findings obtained in the primary document held while controlling for the influence of social support. To accomplish this, we re-ran the PWB models described in the paper with social support added as an observed variable predicting PWB.

Measure

Social support was measured via a subscale of the Deployment Risk and Resilience Inventory (DRRI; King, King, Vogt, Knight, & Samper, 2006). The DRRI contains 13 scales assessing pre-deployment, deployment, and post-deployment experiences and perceptions. The social support subscale contains 15 items, assessed in a 5-point, Likert-type response format. A total score is calculated by adding together the number value of the responses to each item. Higher scores represent greater perceived social support. Internal consistency was strong in our sample of student veterans (Cronbach's $\alpha = .83$, $M = 54.53$, $SD = 9.48$).

Results

Time 1 cross-sectional model. The first model examined the simultaneous associations of PTSD, depression, sleep problems, self-regulation, and social support at Time 1 with the latent variable representing PWB at Time 1 (see Figure B-1). This model provided a marginally adequate fit for the data ($\chi^2[34] = 136.06$, $p < .001$; NFI = .92; CFI = .94; RMSEA = .11). As shown in Figure B-1, higher levels of PWB remained significantly associated with lower levels of depression and higher levels of self-regulation and social support. Of note, the coefficient for the association of depression with PWB was more than thirteen and a half times as large as the coefficient representing the association of PTSD with PWB. PTSD and sleep problems were not significantly associated with PWB in this model.

Longitudinal model. The second model examined the associations of PTSD, depression, sleep problems, self-regulation, and social support at Time 1 with the latent variable representing PWB at Time 2 (see Figure B-2). This model provided an adequate fit for the data ($\chi^2[34] = 85.95$, $p < .001$; NFI = .91; CFI = .94; RMSEA = .08). As shown in Figure B-2, higher levels of PWB were significantly associated with lower levels of depression and higher levels of self-regulation and social support. Of note, the coefficient for the association of depression with PWB was more than fourteen and a half times as large as the coefficient representing the association of PTSD with PWB. PTSD and sleep problems were not significantly associated with PWB.

Conclusion

Our findings basically hold, with social support decreasing the variance in PWB

explained by depression and PTSD by only a small amount. However, the significance of PTSD was reduced, such that it is no longer significant in the cross-sectional or longitudinal models. Overall, findings remain consistent with respect to depression and self-regulation standing out as important risk and protective factors to consider in a broader model. However, social support appears to also be a significant protective factor and may be worth examining in future samples of this population.

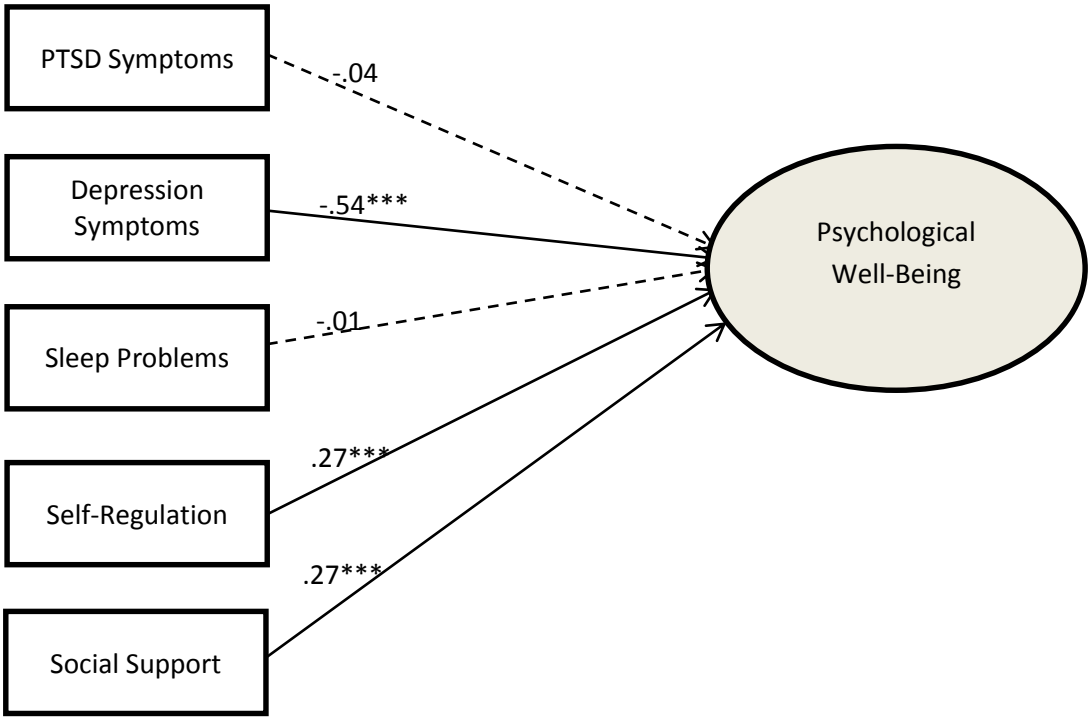

Figure B-1. Structural equation model examining the cross-sectional model with social support at Time 1, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder. * $p < .05$. ** $p < .01$. *** $p < .001$.

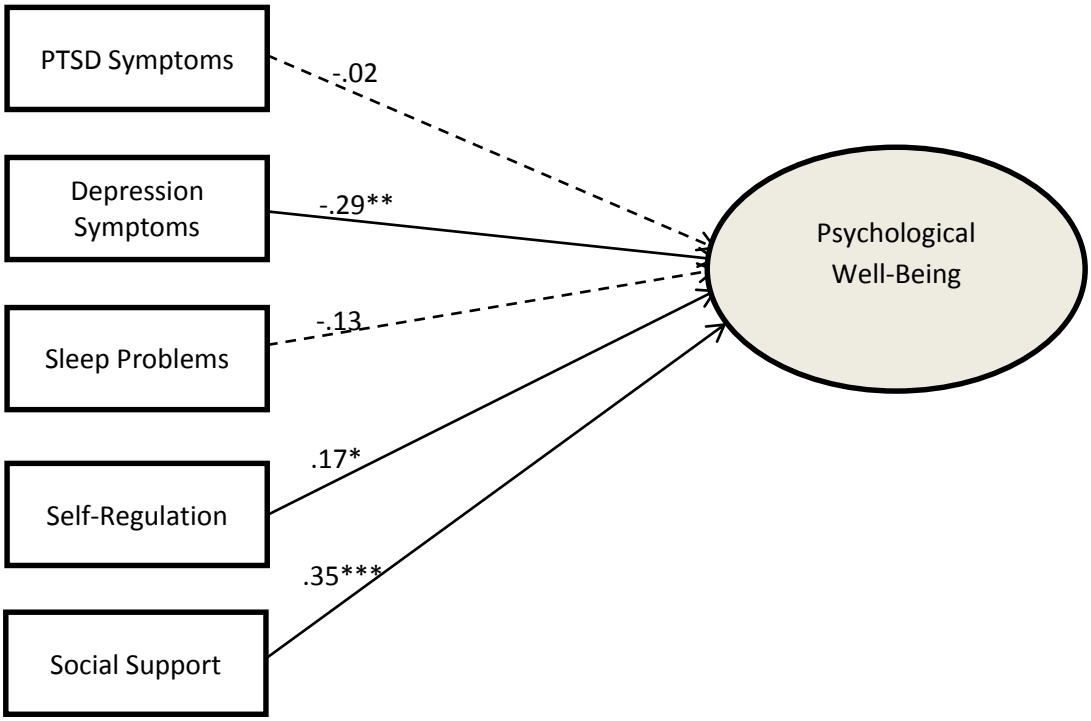

Figure B-2. Structural equation model examining the longitudinal model with social support, with standardized path estimates shown. Dotted lines represent nonsignificant paths. Covariances not shown. PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

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Biography

Jeffrey S. Bergmann graduated from Paris High School, Paris, Missouri, in 1992. He received his Bachelor of Science from the United States Military Academy at West Point, New York, in 1996, and was commissioned as a Second Lieutenant in the Military Police Corps. He received dual Master of Arts degrees in Educational Psychology and Mental Health Counseling from New York University in 2004 and was employed as an Assistant Professor of Psychology in the Department of Behavioral Sciences and Leadership from 2004 to 2007 before returning to operational assignments with the US Army. Lieutenant Colonel Bergmann continues his active duty service in the US Army in his current position as the Battalion Commander for the 787th Military Police Battalion at Fort Leonard Wood, Missouri.